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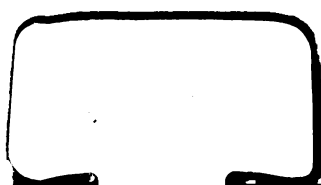
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THE  
MISCELLANEOUS DOCUMENTS

OF THE  
HOUSE OF REPRESENTATIVES

FOR THE



SECOND SESSION OF THE FORTY-EIGHTH CONGRESS.

1884-'85.

IN SEVENTEEN VOLUMES.

VOLUME 9.—No. 33.

WASHINGTON:  
GOVERNMENT PRINTING OFFICE  
1885.



48TH CONGRESS, }  
2d Session. }

HOUSE OF REPRESENTATIVES.

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{ No. 33.

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THE  
  
AMERICAN EPHEMERIS

AND  
  
NAUTICAL ALMANAC

FOR THE YEAR

1888

FIRST EDITION



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PUBLISHED IN COMPLIANCE WITH A JOINT RESOLUTION OF THE FORTY-SIXTH CONGRESS

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WASHINGTON:  
BUREAU OF NAVIGATION.  
1885.

## **JOINT RESOLUTION**

### **FOR PRINTING THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.**

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be printed annually at the Government Printing Office fifteen hundred copies of the American Ephemeris and Nautical Almanac and of the papers supplementary thereto, of which one hundred shall be for the use of the Senate, four hundred for the House of Representatives, and one thousand for the public service, to be distributed by the Navy Department.*

*Sec. 2 That additional copies of the Ephemeris and of the Nautical Almanac extracted therefrom may be ordered by the Secretary of the Navy for sale: Provided, That all moneys received from such sale shall be deposited in the Treasury to the credit of the appropriation for public printing.*

*Approved, February 11, 1880.*

## PREFACE.

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THE contents of the present volume of *The American Ephemeris* are, in general, similar to those of the volume for the preceding year. Beginning with the volume for the year 1882, the arrangement of the work is as follows:—

Part I, *Ephemeris for the Meridian of Greenwich*, gives the positions of the major planets, and other fundamental astronomical data for equidistant intervals of Greenwich mean time.

Part II, *Ephemeris for the Meridian of Washington*, gives the ephemerides of the fixed stars, sun, moon, and major planets for transit over the meridian of Washington. The mean places of the fixed stars and data for their reduction are also included in this Part. The list of mean and apparent places of fixed stars has been greatly enlarged, for the convenience of field-astronomers.

Part III, *Phenomena*, contains predictions of phenomena to be observed, with data for their computation. Washington mean time is used in this part except in a few cases, notably that of eclipses, where Greenwich mean time was judged more convenient. The additions comprise more complete data for eclipses of the sun, diagrams showing the configurations of the satellites of Jupiter, data respecting the disks of Mercury and Venus for the reduction of meridian and photometric observations, and diagrams, with tables, for identifying any known satellites of other planets.

SIMON NEWCOMB,

*Professor U. S. Navy, Superintendent.*

WASHINGTON, February, 1885.





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## CORRECTIONS.

### *Ephemeris for 1885 (First Edition only).*

- Page 249, last line in last column, for 8 30.7 read 8 30.8  
 325, 22 Camelop. (H.), R. A. opposite Oct. 5.7, " .74 " .76  
 Delete - .07 opposite Dec. 34.5 and move column from Oct. 5.7, inclusive, down one line.  
 375, fifth column, for  $\alpha$  Cygni read 31 Cygni  
 408—409, Declination of Neptune from Sept. 1 to Dec. 32, both included, to be increased one degree.  
 417, Third column, second line, remove E to third line.  
 453, Diagram of Jupiter's Satellites, reverse direction of arrows.  
 482, In first column, for Mar. 19<sup>d</sup> 6<sup>h</sup> read Mar. 19<sup>d</sup> 18<sup>h</sup>.  
 502, Line 12, for  $\rho \cos \varphi'$  read  $\rho \sin \varphi'$   
 504, Line 2, for 3<sup>a</sup> read 6<sup>h</sup>

### *The American Nautical Almanac for 1886 (First Edition only).*

- Page 253, Eclipse Charts, first line, for August 18—9 read August 28—9.  
 261, Twenty-third line, " 21<sup>h</sup> 5<sup>m</sup> 57<sup>s</sup>.4 " 21<sup>h</sup> 6<sup>m</sup> 55<sup>s</sup>.06

### *The American Ephemeris and Nautical Almanac for 1886 (First Edition).*

- Page 113, July 5, Moon's Upper Transit, for 2<sup>h</sup> 32<sup>m</sup>.8 read 3<sup>h</sup> 32<sup>m</sup>.8  
 200, Dec. 22, Equation of Time, " 0<sup>m</sup> 8<sup>s</sup>.54 " 1<sup>m</sup> 8<sup>s</sup>.54  
 263, To the heliocentric longitude of Neptune apply the following corrections:  
 Jan. 3, — 0<sup>h</sup>.80; Mar. 8, — 0<sup>h</sup>.96; May 3, — 1<sup>h</sup>.12; July 6, — 1<sup>h</sup>.30; Sept. 8, — 1<sup>h</sup>.48;  
 Nov. 3, — 1<sup>h</sup>.62; Dec. 37, — 1<sup>h</sup>.80, and interpolated values for intermediate dates.  
 249, 409 and 410, To the apparent R. A. and Dec. of Neptune apply the following corrections:

	R. A.	Dec.
Jan. 3,	— 0.05	— 0.2
April 9,	— 0.05	— 0.2
Aug. 15,	— 0.10	— 0.3
Dec. 21,	— 0.11	— 0.5

and interpolated values for intermediate dates.

- 276, From Nov. 16 to Dec. 36, increase  $Q'$  by 1'.  
 482, Under "Washington Mean Times of Elongations," for Titania read Ariel and for Ariel read Titania.  
 504, Lines 5, 8 and 9 from top, for  $\sin \varphi'$  read  $\cos \varphi'$   
 516, Line 8, " 1885.0 " 1886.0  
 517, Line 30, " adapted " adopted.

### *Ephemeris for 1887 (First Edition).*

- Page 294,  $\gamma$  Tauri, in last column, for 12.753 read 12.573  
 296, Dec. of  $\alpha$  Hydrae, " + " —  
 297, In all copies of Ephemeris from 1882 to 1887, for 31 Corone Borealis read 31 Come Berenices  
 298,  $\epsilon$  Cassiopeæ, last column, for + " —  
 298, Dec. of  $\beta$  Corone Borealis, " 46<sup>m</sup>.92 " 43<sup>m</sup>.92  
 299, Groomb. 944, Ann. Var. in R. A., " — " +  
 300,  $\delta$  Draconis (H.) in R. A. " 57<sup>m</sup>.747 " 54<sup>m</sup>.747  
 511, 16th line from bottom, "  $\gamma$  " Y  
 512, Annapolis mean time of Emerson, " 5<sup>h</sup> " 6<sup>h</sup>

# CHRONOLOGICAL ERAS AND CYCLES.

## CHRONOLOGICAL ERAS.

THE YEAR 1888, WHICH COMPRISES THE LATTER PART OF THE 112TH AND THE BEGINNING OF THE 113TH YEAR OF THE INDEPENDENCE OF THE UNITED STATES OF AMERICA, CORRESPONDS TO—

The year 6601 of the Julian Period;

- “ 7396-97 of the Byzantine era, the year 7397 commencing on September 1st;
- “ 5648-49 of the Jewish era, the year 5649 commencing on September 6th, or, more exactly, at sunset on September 5th;
- “ 2641 since the foundation of Rome, according to VARRO;
- “ 2635 since the beginning of the era of NABONASSAR, which has been assigned to Wednesday, the 26th of February of the 3067th year of the Julian Period: corresponding, in the notation of chronologists, to the 747th; and, in the notation of astronomers, to the 746th year before the birth of CHRIST;
- “ 2664 of the Olympiads, or the fourth year of the 666th Olympiad commencing in July, 1887, if we fix the era of the Olympiads at 775½ years before CHRIST, or near the beginning of July of the year 3938 of the Julian Period;
- “ 2200 of the Grecian era, or the era of the Seleucidæ;
- “ 1604 of the era of DIOCLETIAN;
- “ 2548 of the Japanese era and to the 21st year of the period entitled “Meiji.”

The year 1306 of the Mohammedan era, or the era of the Hegira, begins on the 7th day of September, 1888.

The first day of January of the year 1888 is the 2,410,638th day since the commencement of the Julian Period.

## CHRONOLOGICAL CYCLES.

Dominical Letter . . . . .	A, G.	Solar Cycle . . . . .	21
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Lunar Cycle or Golden Number . . . .	8	Julian Period . . . . .	6601

## SYMBOLS AND ABBREVIATIONS.

---

### SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
♁	The Earth.	♆	Neptune.

### SIGNS OF THE ZODIAC.

Spring Signs.	1.	♈	Aries.	Autumn Signs.	7.	♎	Libra.
	2.	♉	Taurus.		8.	♏	Scorpius.
	3.	♊	Gemini.		9.	♐	Sagittarius.
Summer Signs.	4.	♋	Cancer.	Winter Signs.	10.	♑	Capricornus.
	5.	♌	Leo.		11.	♒	Aquarius.
	6.	♍	Virgo.		12.	♓	Pisces.

### ASPECTS.

- ♌ Conjunction, or having the same Longitude or Right Ascension.
- ☐ Quadrature, or differing 90° in Longitude or Right Ascension.
- ♌ Opposition, or differing 180° in Longitude or Right Ascension.

### ABBREVIATIONS.

♊	Ascending Node.	°	Degrees.
♋	Descending Node.	'	Minutes of Arc.
N.	North.	"	Seconds of Arc.
S.	South.	h	Hours.
E.	East.	m	Minutes of Time.
W.	West.	s	Seconds of Time.

*P A R T I .*

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**ASTRONOMICAL EPHEMERIS**

**FOR THE**

**MERIDIAN OF GREENWICH.**

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidercal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>
SUN.	1	18 45 59.59	11.043	S. 23 1 50.5	+12.14	16 18.44	71.10	3 39.55	1.182
Mon.	2	18 50 24.45	11.029	22 56 45.5	13.28	16 18.43	71.06	4 7.77	1.169
Tues.	3	18 54 48.97	11.014	22 51 13.0	14.42	16 18.42	71.01	4 35.66	1.155
Wed.	4	18 59 13.14	10.999	22 45 13.2	+15.56	16 18.40	70.95	5 3.18	1.140
Thur.	5	19 3 36.91	10.992	22 38 46.4	16.69	16 18.38	70.89	5 30.32	1.123
Frid.	6	19 8 0.26	10.964	22 31 52.7	17.80	16 18.35	70.83	5 57.04	1.105
Sat.	7	19 12 23.17	10.945	22 24 32.2	+18.91	16 18.32	70.77	6 23.32	1.086
SUN.	8	19 16 45.61	10.924	22 16 45.2	20.00	16 18.28	70.70	6 49.13	1.065
Mon.	9	19 21 7.54	10.903	22 8 31.9	21.09	16 18.24	70.63	7 14.44	1.044
Tues.	10	19 25 28.95	10.881	21 59 52.6	+22.17	16 18.20	70.56	7 39.23	1.022
Wed.	11	19 29 49.80	10.857	21 50 47.5	23.24	16 18.15	70.48	8 3.46	0.998
Thur.	12	19 34 10.07	10.832	21 41 16.9	24.29	16 18.10	70.40	8 27.10	0.973
Frid.	13	19 38 29.73	10.806	21 31 21.1	+25.34	16 18.04	70.31	8 50.15	0.947
Sat.	14	19 42 48.75	10.779	21 21 0.3	26.37	16 17.98	70.22	9 12.56	0.920
SUN.	15	19 47 7.11	10.752	21 10 14.8	27.40	16 17.91	70.13	9 34.30	0.893
Mon.	16	19 51 24.79	10.723	20 59 5.0	+28.41	16 17.84	70.04	9 55.36	0.864
Tues.	17	19 55 41.77	10.693	20 47 31.1	29.39	16 17.77	69.94	10 15.72	0.835
Wed.	18	19 59 58.03	10.662	20 35 33.6	30.36	16 17.69	69.84	10 35.37	0.804
Thur.	19	20 4 13.54	10.631	20 23 12.7	+31.33	16 17.61	69.74	10 54.27	0.773
Frid.	20	20 8 28.28	10.599	20 10 28.9	32.28	16 17.53	69.64	11 12.41	0.741
Sat.	21	20 12 42.25	10.566	19 57 22.3	33.22	16 17.44	69.53	11 29.78	0.708
SUN.	22	20 16 55.43	10.533	19 43 53.4	+34.14	16 17.34	69.43	11 46.36	0.675
Mon.	23	20 21 7.82	10.500	19 30 2.7	35.05	16 17.24	69.32	12 2.15	0.642
Tues.	24	20 25 19.40	10.467	19 15 50.4	35.94	16 17.14	69.21	12 17.13	0.609
Wed.	25	20 29 30.17	10.433	19 1 16.9	+36.82	16 17.03	69.10	12 31.30	0.575
Thur.	26	20 33 40.13	10.398	18 46 22.5	37.68	16 16.91	68.99	12 44.66	0.541
Frid.	27	20 37 49.27	10.364	18 31 7.7	38.53	16 16.79	68.88	12 57.22	0.507
Sat.	28	20 41 57.59	10.330	18 15 32.8	+39.36	16 16.66	68.77	13 8.96	0.473
SUN.	29	20 46 5.09	10.296	17 59 38.3	40.17	16 16.53	68.65	13 19.88	0.439
Mon.	30	20 50 11.78	10.262	17 43 24.4	40.97	16 16.39	68.54	13 29.98	0.405
Tues.	31	20 54 17.66	10.228	17 26 51.6	41.75	16 16.24	68.42	13 39.27	0.371
Wed.	32	20 58 22.73	10.194	S. 17 10 0.3	+42.51	16 16.09	68.31	13 47.76	0.337

NOTE.—The mean time of semidiameter passing may be found by subtracting 0°.19 from the sidereal time.

The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Subtracted from Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
<i>SUN.</i>	1	<sup>h</sup> 18 <sup>m</sup> 45 <sup>s</sup> 58.92	<sup>s</sup> 11.039	<i>S.</i> 23° 1' 51".2	+12".13	<sup>m</sup> 3 <sup>s</sup> 39.47	<sup>s</sup> 1.182	<sup>h</sup> 18 <sup>m</sup> 42 <sup>s</sup> 19.45
Mon.	2	18 50 23.69	11.025	22 56 46.4	13.27	4 7.69	1.169	18 46 16.00
Tues.	3	18 54 48.13	11.011	22 51 14.1	14.42	4 35.57	1.155	18 50 12.56
Wed.	4	18 59 12.21	10.996	22 45 14.5	+15.55	5 3.09	1.140	18 54 9.12
Thur.	5	19 3 35.90	10.979	22 38 47.9	16.68	5 30.22	1.123	18 58 5.68
Frid.	6	19 7 59.17	10.961	22 31 54.4	17.79	5 56.94	1.105	19 2 2.23
Sat.	7	19 12 22.00	10.942	22 24 34.2	+18.90	6 23.21	1.086	19 5 58.79
<i>SUN.</i>	8	19 16 44.36	10.921	22 16 47.4	19.99	6 49.02	1.065	19 9 55.34
Mon.	9	19 21 6.22	10.900	22 8 34.4	21.08	7 14.32	1.044	19 13 51.90
Tues.	10	19 25 27.56	10.878	21 59 55.4	+22.16	7 39.11	1.022	19 17 48.45
Wed.	11	19 29 48.34	10.854	21 50 50.6	23.23	8 3.33	0.998	19 21 45.01
Thur.	12	19 34 8.54	10.829	21 41 20.3	24.28	8 26.97	0.973	19 25 41.57
Frid.	13	19 38 28.14	10.803	21 31 24.8	+25.33	8 50.01	0.947	19 29 38.13
Sat.	14	19 42 47.10	10.776	21 21 4.3	26.36	9 12.42	0.920	19 33 34.68
<i>SUN.</i>	15	19 47 5.40	10.749	21 10 19.1	27.39	9 34.16	0.893	19 37 31.24
Mon.	16	19 51 23.02	10.720	20 59 9.6	+28.40	9 55.22	0.864	19 41 27.80
Tues.	17	19 55 39.94	10.691	20 47 36.1	29.39	10 15.58	0.835	19 45 24.36
Wed.	18	19 59 56.14	10.660	20 35 38.9	30.35	10 35.23	0.804	19 49 20.91
Thur.	19	20 4 11.60	10.629	20 23 18.4	+31.33	10 54.13	0.773	19 53 17.47
Frid.	20	20 8 26.30	10.597	20 10 34.9	32.28	11 12.27	0.741	19 57 14.02
Sat.	21	20 12 40.22	10.564	19 57 28.7	33.22	11 29.64	0.708	20 1 10.58
<i>SUN.</i>	22	20 16 53.36	10.531	19 44 0.2	+34.14	11 46.23	0.675	20 5 7.13
Mon.	23	20 21 5.71	10.498	19 30 9.8	35.05	12 2.02	0.642	20 9 3.69
Tues.	24	20 25 17.25	10.465	19 15 57.8	35.94	12 17.00	0.609	20 13 0.25
Wed.	25	20 29 27.99	10.431	19 1 24.6	+36.82	12 31.18	0.575	20 16 56.81
Thur.	26	20 33 37.92	10.397	18 46 30.5	37.68	12 44.55	0.541	20 20 53.36
Frid.	27	20 37 47.03	10.363	18 31 16.0	38.52	12 57.11	0.507	20 24 49.92
Sat.	28	20 41 55.33	10.329	18 15 41.4	+39.35	13 8.86	0.473	20 28 46.47
<i>SUN.</i>	29	20 46 2.81	10.295	17 59 47.2	40.16	13 19.78	0.439	20 32 43.03
Mon.	30	20 50 9.47	10.261	17 43 33.6	40.96	13 29.89	0.405	20 36 39.58
Tues.	31	20 54 15.33	10.227	17 27 1.1	41.74	13 39.19	0.371	20 40 36.14
Wed.	32	20 58 20.38	10.193	<i>S.</i> 17 10 10.0	+42.50	13 47.69	0.337	20 44 32.69

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing.

Diff. for 1 hour,  
+9.8565.  
(Table III.)



AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	1	280° 34' 26.4"	34' 39.2"	152.87	+ 0.39	9.9926421	+ 0.3	<sup>h</sup> 5 <sup>m</sup> 16 <sup>s</sup> 48.50
2	2	281 35 35.3	35 47.9	152.87	0.52	9.9926442	1.4	5 12 52.59
3	3	282 36 44.4	36 56.8	152.88	0.63	9.9926489	2.5	5 8 56.69
4	4	283 37 53.6	38 5.8	152.88	+ 0.72	9.9926563	+ 3.5	5 5 0.78
5	5	284 39 2.9	39 14.9	152.89	0.80	9.9926662	4.6	5 1 4.86
6	6	285 40 12.4	40 24.2	152.89	0.86	9.9926785	5.6	4 57 8.95
7	7	286 41 22.0	41 33.7	152.90	+ 0.90	9.9926930	+ 6.5	4 53 13.04
8	8	287 42 31.7	42 43.2	152.90	0.91	9.9927097	7.3	4 49 17.13
9	9	288 43 41.4	43 52.7	152.90	0.88	9.9927284	8.1	4 45 21.22
10	10	289 44 51.0	45 2.2	152.90	+ 0.82	9.9927489	+ 8.9	4 41 25.31
11	11	290 46 0.5	46 11.6	152.89	0.73	9.9927711	9.6	4 37 29.40
12	12	291 47 9.8	47 20.7	152.88	0.62	9.9927949	10.3	4 33 33.49
13	13	292 48 18.8	48 29.5	152.86	+ 0.50	9.9928204	+11.0	4 29 37.58
14	14	293 49 27.3	49 37.8	152.84	0.37	9.9928476	11.7	4 25 41.67
15	15	294 50 35.3	50 45.7	152.82	0.23	9.9928764	12.3	4 21 45.76
16	16	295 51 42.7	51 53.0	152.79	+ 0.09	9.9929068	+13.0	4 17 49.85
17	17	296 52 49.4	52 59.5	152.76	− 0.03	9.9929390	13.7	4 13 53.93
18	18	297 53 55.3	54 5.2	152.72	0.15	9.9929730	14.4	4 9 58.02
19	19	298 55 0.2	55 10.0	152.68	− 0.23	9.9930087	+15.2	4 6 2.11
20	20	299 56 4.1	56 13.8	152.64	0.30	9.9930462	16.0	4 2 6.20
21	21	300 57 7.1	57 16.7	152.60	0.34	9.9930857	16.9	3 58 10.29
22	22	301 58 9.1	58 18.5	152.56	− 0.34	9.9931275	+17.9	3 54 14.38
23	23	302 59 10.0	59 19.2	152.52	0.31	9.9931716	18.9	3 50 18.47
24	24	304 0 9.9	0 19.0	152.48	0.26	9.9932182	19.9	3 46 22.56
25	25	305 1 8.7	1 17.7	152.43	− 0.17	9.9932673	+21.0	3 42 26.65
26	26	306 2 6.4	2 15.3	152.39	− 0.07	9.9933189	22.0	3 38 30.74
27	27	307 3 3.1	3 11.8	152.34	+ 0.04	9.9933730	23.1	3 34 34.83
28	28	308 3 58.8	4 7.3	152.30	+ 0.16	9.9934297	+24.1	3 30 38.92
29	29	309 4 53.5	5 1.9	152.26	0.29	9.9934890	25.2	3 26 43.01
30	30	310 5 47.2	5 55.5	152.22	0.41	9.9935508	26.2	3 22 47.10
31	31	311 6 40.0	6 48.2	152.18	0.52	9.9936152	27.3	3 18 51.19
32	32	312 7 31.9	7 39.9	152.14	+ 0.61	9.9936820	+28.3	3 14 55.28
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>d</sup> .0.								Diff. for 1 Hour, — 9 <sup>s</sup> .8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	15' 42.9	15' 46.6	57' 33.6	+1.17	57' 47.2	+1.10	14 25.2	2.23	17.7
2	15 50.1	15 53.3	57 59.9	1.03	58 11.8	0.95	15 18.1	2.18	18.7
3	15 56.3	15 59.0	58 22.8	0.88	58 32.9	0.80	16 9.8	2.13	19.7
4	16 1.5	16 3.8	58 42.1	+0.73	58 50.5	+0.66	17 0.6	2.11	20.7
5	16 5.9	16 7.7	58 58.0	0.59	59 4.6	0.51	17 51.1	2.11	21.7
6	16 9.2	16 10.5	59 10.3	0.43	59 15.0	0.34	18 42.1	2.14	22.7
7	16 11.4	16 12.0	59 18.5	+0.24	59 20.7	+0.13	19 34.3	2.21	23.7
8	16 12.3	16 12.1	59 21.6	+0.01	59 20.9	-0.13	20 28.2	2.29	24.7
9	16 11.4	16 10.3	59 18.5	-0.28	59 14.2	0.44	21 24.1	2.36	25.7
10	16 8.6	16 6.3	59 7.9	-0.61	58 59.6	-0.78	22 21.5	2.40	26.7
11	16 3.5	16 0.1	58 49.2	0.95	58 36.8	1.11	23 19.2	2.39	27.7
12	15 56.2	15 51.8	58 22.5	1.27	58 6.4	1.41	6		28.7
13	15 47.0	15 41.9	57 48.8	-1.52	57 30.0	-1.60	0 15.8	2.32	0.1
14	15 36.6	15 31.1	57 10.4	1.66	56 50.3	1.68	1 10.2	2.20	1.1
15	15 25.6	15 20.1	56 30.0	1.68	56 9.9	1.65	2 1.5	2.07	2.1
16	15 14.8	15 9.8	55 50.5	-1.58	55 32.1	-1.48	2 49.7	1.95	3.1
17	15 5.1	15 0.9	55 14.9	1.36	54 59.5	1.21	3 35.2	1.84	4.1
18	14 57.2	14 54.1	54 45.9	1.05	54 34.4	0.86	4 18.6	1.78	5.1
19	14 51.6	14 49.8	54 25.2	-0.66	54 18.5	-0.45	5 0.7	1.74	6.1
20	14 48.6	14 48.2	54 14.4	-0.23	54 12.9	-0.02	5 42.5	1.75	7.1
21	14 48.5	14 49.6	54 14.0	+0.21	54 17.9	+0.43	6 24.8	1.78	8.1
22	14 51.3	14 53.8	54 24.3	+0.64	54 33.3	+0.85	7 8.4	1.85	9.1
23	14 56.9	15 0.6	54 44.7	1.04	54 58.3	1.22	7 53.9	1.95	10.1
24	15 4.8	15 9.6	55 13.9	1.38	55 31.3	1.51	8 41.9	2.06	11.1
25	15 14.7	15 20.1	55 50.2	+1.62	56 10.1	+1.70	9 32.5	2.16	12.1
26	15 25.8	15 31.5	56 30.9	1.75	56 52.0	1.76	10 25.5	2.25	13.1
27	15 37.3	15 42.9	57 13.1	1.74	57 33.7	1.68	11 20.1	2.29	14.1
28	15 48.3	15 53.4	57 53.5	+1.60	58 12.1	+1.48	12 15.2	2.30	15.1
29	15 58.0	16 2.1	58 29.1	1.34	58 44.3	1.18	13 10.0	2.26	16.1
30	16 5.7	16 8.7	58 57.5	1.00	59 8.4	0.81	14 3.7	2.21	17.1
31	16 11.0	16 12.7	59 16.9	0.62	59 23.2	0.43	14 56.3	2.17	18.1
32	16 13.8	16 14.4	59 27.3	+0.25	59 29.2	+0.08	15 48.0	2.14	19.1

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 1.					TUESDAY 3.				
0	8 36 24.70	2.3302	N.18° 19' 5.9"	5.440	0	10 26 30.33	2.2507	N.12° 3' 55.8"	9.889
1	8 38 44.48	2.3291	18 13 35.7	5.557	1	10 28 45.32	2.2489	11 54 0.7	9.954
2	8 41 4.19	2.3280	18 7 59.0	5.665	2	10 31 0.20	2.2479	11 44 1.3	10.025
3	8 43 23.84	2.3269	18 2 15.9	5.772	3	10 33 14.98	2.2454	11 33 57.7	10.094
4	8 45 43.42	2.3257	17 56 26.3	5.880	4	10 35 29.65	2.2436	11 23 50.0	10.162
5	8 48 2.93	2.3245	17 50 30.3	5.987	5	10 37 44.21	2.2418	11 13 38.3	10.228
6	8 50 22.36	2.3233	17 44 27.9	6.093	6	10 39 58.67	2.2401	11 3 22.6	10.295
7	8 52 41.71	2.3219	17 38 19.1	6.199	7	10 42 13.03	2.2385	10 53 2.9	10.361
8	8 55 0.99	2.3206	17 32 4.0	6.303	8	10 44 27.29	2.2368	10 42 39.3	10.425
9	8 57 20.19	2.3193	17 25 42.7	6.407	9	10 46 41.44	2.2351	10 32 11.9	10.488
10	8 59 39.31	2.3179	17 19 15.1	6.511	10	10 48 55.50	2.2335	10 21 40.7	10.551
11	9 1 58.34	2.3164	17 12 41.3	6.614	11	10 51 9.46	2.2318	10 11 5.8	10.612
12	9 4 17.28	2.3149	17 6 1.4	6.716	12	10 53 23.32	2.2309	10 0 27.2	10.673
13	9 6 36.13	2.3134	16 59 15.4	6.819	13	10 55 37.09	2.2287	9 49 45.0	10.739
14	9 8 54.89	2.3119	16 52 23.2	6.921	14	10 57 50.76	2.2271	9 38 59.4	10.789
15	9 11 13.56	2.3103	16 45 24.9	7.022	15	11 0 4.34	2.2256	9 28 10.3	10.846
16	9 13 32.13	2.3088	16 38 20.6	7.121	16	11 2 17.83	2.2242	9 17 17.8	10.903
17	9 15 50.61	2.3073	16 31 10.4	7.219	17	11 4 31.24	2.2227	9 6 21.9	10.958
18	9 18 8.99	2.3055	16 23 54.3	7.318	18	11 6 44.56	2.2213	8 55 22.8	11.011
19	9 20 27.27	2.3038	16 16 32.3	7.416	19	11 8 57.80	2.2199	8 44 20.5	11.064
20	9 22 45.45	2.3022	16 9 4.4	7.512	20	11 11 10.95	2.2185	8 33 15.1	11.117
21	9 25 3.53	2.3005	16 1 30.8	7.608	21	11 13 24.02	2.2172	8 22 6.5	11.168
22	9 27 21.51	2.2987	15 53 51.4	7.704	22	11 15 37.01	2.2158	8 10 54.9	11.217
23	9 29 39.38	2.2970	N.15 46 6.3	7.798	23	11 17 49.92	2.2146	N. 7 59 40.4	11.266
MONDAY 2.					WEDNESDAY 4.				
0	9 31 57.15	2.2952	N.15 38 15.6	7.892	0	11 20 2.76	2.2133	N. 7 48 23.0	11.313
1	9 34 14.81	2.2934	15 30 19.3	7.985	1	11 22 15.52	2.2121	7 37 2.8	11.360
2	9 36 32.36	2.2917	15 22 17.4	8.077	2	11 24 28.21	2.2110	7 25 39.8	11.406
3	9 38 49.81	2.2899	15 14 10.0	8.168	3	11 26 40.84	2.2099	7 14 14.1	11.450
4	9 41 7.15	2.2880	15 5 57.2	8.258	4	11 28 53.40	2.2088	7 2 45.8	11.493
5	9 43 24.37	2.2861	14 57 39.0	8.348	5	11 31 5.90	2.2078	6 51 14.9	11.535
6	9 45 41.48	2.2842	14 49 15.4	8.437	6	11 33 18.34	2.2068	6 39 41.6	11.576
7	9 47 58.48	2.2824	14 40 46.5	8.525	7	11 35 30.72	2.2058	6 28 5.8	11.617
8	9 50 15.37	2.2806	14 32 12.4	8.613	8	11 37 43.04	2.2048	6 16 27.6	11.656
9	9 52 32.15	2.2787	14 23 33.0	8.699	9	11 39 55.30	2.2039	6 4 47.1	11.693
10	9 54 48.82	2.2768	14 14 48.5	8.783	10	11 42 7.51	2.2031	5 53 4.4	11.730
11	9 57 5.37	2.2749	14 5 59.0	8.867	11	11 44 19.68	2.2024	5 41 19.5	11.766
12	9 59 21.81	2.2731	13 57 4.4	8.951	12	11 46 31.80	2.2017	5 29 32.5	11.801
13	10 1 38.14	2.2712	13 48 4.8	9.034	13	11 48 43.88	2.2009	5 17 43.4	11.834
14	10 3 54.35	2.2693	13 39 0.3	9.116	14	11 50 55.91	2.2002	5 5 52.4	11.866
15	10 6 10.45	2.2674	13 29 50.9	9.197	15	11 53 7.90	2.1996	4 53 50.5	11.897
16	10 8 26.44	2.2656	13 20 36.6	9.277	16	11 55 19.86	2.1990	4 42 4.7	11.927
17	10 10 42.32	2.2637	13 11 17.6	9.356	17	11 57 31.78	2.1984	4 30 8.2	11.956
18	10 12 58.08	2.2618	13 1 53.9	9.434	18	11 59 43.67	2.1979	4 18 10.0	11.984
19	10 15 13.73	2.2599	12 52 25.5	9.512	19	12 1 55.53	2.1975	4 6 10.1	12.012
20	10 17 29.27	2.2581	12 42 52.5	9.588	20	12 4 7.37	2.1973	3 54 8.6	12.038
21	10 19 44.70	2.2563	12 33 15.0	9.663	21	12 6 19.19	2.1968	3 42 5.6	12.062
22	10 22 0.02	2.2544	12 23 33.0	9.737	22	12 8 30.99	2.1965	3 30 1.2	12.084
23	10 24 15.23	2.2526	12 13 46.6	9.810	23	12 10 42.77	2.1963	3 17 55.5	12.106
24	10 26 30.33	2.2507	N.12 3 55.8	9.882	24	12 12 54.54	2.1961	N. 3 5 48.5	12.127

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 5.					SATURDAY 7.				
0	12 12 54.54	2.1961	N. 3° 5' 48.5"	19.137	0	13 59 2.18	2.3451	S. 6° 38' 49.9"	11.780
1	12 15 6.30	2.1969	2 53 40.2	12.148	1	14 1 16.95	2.3473	6 50 35.6	11.743
2	12 17 18.05	2.1968	2 41 30.7	12.167	2	14 3 31.86	2.3496	7 2 19.1	11.706
3	12 19 29.79	2.1957	2 29 20.1	12.185	3	14 5 46.90	2.3518	7 14 0.3	11.667
4	12 21 41.53	2.1957	2 17 8.5	12.202	4	14 8 2.08	2.3541	7 25 39.1	11.637
5	12 23 53.27	2.1957	2 4 55.9	12.217	5	14 10 17.40	2.3565	7 37 15.5	11.595
6	12 26 5.02	2.1958	1 52 42.5	12.231	6	14 12 32.86	2.3589	7 48 49.3	11.542
7	12 28 16.77	2.1959	1 40 28.2	12.245	7	14 14 48.47	2.3614	8 0 20.5	11.498
8	12 30 28.53	2.1961	1 28 13.1	12.257	8	14 17 4.23	2.3638	8 11 49.1	11.454
9	12 32 40.31	2.1964	1 15 57.4	12.267	9	14 19 20.13	2.3663	8 23 15.0	11.407
10	12 34 52.10	2.1967	1 3 41.1	12.277	10	14 21 36.18	2.3689	8 34 38.0	11.359
11	12 37 3.91	2.1971	0 51 24.2	12.286	11	14 23 52.39	2.3715	8 45 58.1	11.311
12	12 39 15.75	2.1975	0 39 6.8	12.293	12	14 26 8.76	2.3741	8 57 15.3	11.261
13	12 41 27.61	2.1979	0 26 49.0	12.300	13	14 28 25.28	2.3767	9 8 29.4	11.209
14	12 43 39.50	2.1983	0 14 30.8	12.305	14	14 30 41.96	2.3794	9 19 40.4	11.157
15	12 45 51.41	2.1988	N. 0 2 12.4	12.309	15	14 32 58.81	2.3821	9 30 48.3	11.104
16	12 48 3.36	2.1995	S. 0 10 6.2	12.312	16	14 35 15.82	2.3848	9 41 52.9	11.049
17	12 50 15.35	2.2002	0 22 25.0	12.313	17	14 37 32.99	2.3876	9 52 54.2	10.993
18	12 52 27.38	2.2009	0 34 43.8	12.313	18	14 39 50.33	2.3904	10 3 52.1	10.936
19	12 54 39.46	2.2017	0 47 2.6	12.313	19	14 42 7.84	2.3932	10 14 46.5	10.877
20	12 56 51.58	2.2024	0 59 21.4	12.312	20	14 44 25.52	2.3961	10 25 37.4	10.817
21	12 59 3.75	2.2032	1 11 40.1	12.310	21	14 46 43.37	2.3990	10 36 24.6	10.756
22	13 1 15.97	2.2042	1 23 58.6	12.305	22	14 49 1.39	2.3019	10 47 8.1	10.694
23	13 3 28.25	2.2052	S. 1 36 16.7	12.299	23	14 51 19.59	2.3048	S. 10 57 47.9	10.631
FRIDAY 6.					SUNDAY 8.				
0	13 5 40.59	2.2062	S. 1 48 34.4	12.299	0	14 53 37.96	2.3077	S. 11 8 23.8	10.566
1	13 7 52.99	2.2072	2 0 51.7	12.285	1	14 55 56.51	2.3107	11 18 55.8	10.500
2	13 10 5.46	2.2083	2 13 8.6	12.277	2	14 58 15.24	2.3136	11 29 23.8	10.433
3	13 12 17.99	2.2094	2 25 24.9	12.266	3	15 0 34.14	2.3165	11 39 47.8	10.365
4	13 14 30.59	2.2107	2 37 40.5	12.255	4	15 2 53.22	2.3196	11 50 7.6	10.295
5	13 16 43.27	2.2120	2 49 55.5	12.243	5	15 5 12.49	2.3227	12 0 23.2	10.225
6	13 18 56.03	2.2133	3 2 9.7	12.229	6	15 7 31.94	2.3257	12 10 34.6	10.153
7	13 21 8.87	2.2147	3 14 23.0	12.214	7	15 9 51.57	2.3287	12 20 41.6	10.080
8	13 23 21.79	2.2160	3 26 35.4	12.198	8	15 12 11.39	2.3318	12 30 44.2	10.006
9	13 25 34.79	2.2174	3 38 46.8	12.182	9	15 14 31.39	2.3348	12 40 42.3	9.930
10	13 27 47.88	2.2190	3 50 57.2	12.163	10	15 16 51.57	2.3379	12 50 35.8	9.852
11	13 30 1.07	2.2206	4 3 6.4	12.143	11	15 19 11.94	2.3410	13 0 24.6	9.774
12	13 32 14.35	2.2222	4 15 14.4	12.122	12	15 21 32.49	2.3441	13 10 8.7	9.696
13	13 34 27.73	2.2239	4 27 21.1	12.100	13	15 23 53.23	2.3472	13 19 48.1	9.616
14	13 36 41.21	2.2256	4 39 26.4	12.077	14	15 26 14.15	2.3502	13 29 22.6	9.534
15	13 38 54.80	2.2273	4 51 30.4	12.054	15	15 28 35.26	2.3533	13 38 52.2	9.452
16	13 41 8.49	2.2291	5 3 32.9	12.028	16	15 30 56.55	2.3564	13 48 16.8	9.368
17	13 43 22.29	2.2309	5 15 33.8	12.001	17	15 33 18.03	2.3596	13 57 36.3	9.283
18	13 45 36.20	2.2328	5 27 33.0	11.973	18	15 35 39.70	2.3627	14 6 50.7	9.197
19	13 47 50.23	2.2348	5 39 30.5	11.944	19	15 38 1.55	2.3657	14 15 59.9	9.109
20	13 50 4.38	2.2367	5 51 26.3	11.914	20	15 40 23.59	2.3688	14 25 3.8	9.021
21	13 52 18.64	2.2387	6 3 20.2	11.882	21	15 42 45.81	2.3718	14 34 2.4	8.932
22	13 54 33.03	2.2408	6 15 12.1	11.849	22	15 45 8.21	2.3749	14 42 55.6	8.841
23	13 56 47.54	2.2429	6 27 2.0	11.815	23	15 47 30.80	2.3780	14 51 43.3	8.749
24	13 59 2.18	2.2451	S. 6 38 49.9	11.780	24	15 49 53.57	2.3810	S. 15 0 25.5	8.657

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 9.					WEDNESDAY 11.				
0	15 <sup>h</sup> 49 <sup>m</sup> 53.57 <sup>s</sup>	2.3810	S. 15° 0' 25.5"	8.657	0	17 <sup>h</sup> 47 <sup>m</sup> 0.97 <sup>s</sup>	2.4783	S. 19° 50' 48.4"	3.147
1	15 52 16.52	2.3840	15 9 2.1	8.563	1	17 49 29.68	2.4787	19 53 53.3	3.017
2	15 54 39.65	2.3870	15 17 33.0	8.468	2	17 51 58.41	2.4790	19 56 50.4	2.887
3	15 57 2.96	2.3900	15 25 58.2	8.372	3	17 54 27.16	2.4792	19 59 30.7	2.757
4	15 59 26.45	2.3930	15 34 17.6	8.274	4	17 56 55.92	2.4793	20 2 21.2	2.626
5	16 1 50.12	2.3959	15 42 31.1	8.176	5	17 59 24.68	2.4793	20 4 54.8	2.495
6	16 4 13.96	2.3988	15 50 38.7	8.077	6	18 1 53.44	2.4792	20 7 20.6	2.364
7	16 6 37.97	2.4017	15 58 40.3	7.977	7	18 4 22.19	2.4790	20 9 38.5	2.233
8	16 9 2.16	2.4046	16 6 35.9	7.876	8	18 6 50.94	2.4791	20 11 48.5	2.102
9	16 11 26.52	2.4074	16 14 25.4	7.773	9	18 9 19.68	2.4788	20 13 50.7	1.971
10	16 13 51.05	2.4102	16 22 8.7	7.669	10	18 11 48.40	2.4784	20 15 45.0	1.839
11	16 16 15.74	2.4129	16 29 45.7	7.564	11	18 14 17.09	2.4779	20 17 31.4	1.707
12	16 18 40.60	2.4157	16 37 16.4	7.459	12	18 16 45.74	2.4773	20 19 9.9	1.576
13	16 21 5.63	2.4184	16 44 40.8	7.353	13	18 19 14.36	2.4767	20 20 40.5	1.444
14	16 23 30.81	2.4210	16 51 58.8	7.247	14	18 21 42.94	2.4759	20 22 3.2	1.313
15	16 25 56.15	2.4237	16 59 10.4	7.139	15	18 24 11.47	2.4750	20 23 18.1	1.181
16	16 28 21.65	2.4263	17 6 15.5	7.029	16	18 26 39.94	2.4741	20 24 25.0	1.049
17	16 30 47.30	2.4288	17 13 13.9	6.918	17	18 29 8.36	2.4731	20 25 24.0	0.918
18	16 33 13.11	2.4314	17 20 5.7	6.807	18	18 31 36.71	2.4719	20 26 15.2	0.787
19	16 35 39.07	2.4338	17 26 50.8	6.696	19	18 34 4.99	2.4707	20 26 58.5	0.656
20	16 38 5.17	2.4362	17 33 29.2	6.583	20	18 36 33.20	2.4695	20 27 33.9	0.525
21	16 40 31.41	2.4385	17 40 0.8	6.470	21	18 39 1.33	2.4681	20 28 1.5	0.394
22	16 42 57.79	2.4408	17 46 25.6	6.356	22	18 41 29.37	2.4666	20 28 21.2	0.263
23	16 45 24.31	2.4431	S. 17° 52' 43.5"	6.240	23	18 43 57.32	2.4650	S. 20° 28' 33.1"	0.133
TUESDAY 10.					THURSDAY 12.				
0	16 47 50.97	2.4454	S. 17° 58' 54.4"	6.123	0	18 46 25.17	2.4633	S. 20° 28' 37.2"	- 0.003
1	16 50 17.76	2.4475	18 4 58.3	6.007	1	18 48 52.92	2.4616	20 28 33.5	+ 0.197
2	16 52 44.67	2.4496	18 10 55.2	5.890	2	18 51 20.56	2.4597	20 28 22.0	0.257
3	16 55 11.71	2.4517	18 16 45.1	5.773	3	18 53 48.09	2.4578	20 28 2.7	0.386
4	16 57 38.87	2.4536	18 22 27.9	5.653	4	18 56 15.50	2.4558	20 27 35.7	0.514
5	17 0 6.14	2.4554	18 28 3.5	5.533	5	18 58 42.79	2.4537	20 27 1.0	0.643
6	17 2 33.52	2.4573	18 33 31.8	5.412	6	19 1 9.94	2.4514	20 26 18.5	0.771
7	17 5 1.01	2.4591	18 38 52.9	5.291	7	19 3 36.96	2.4492	20 25 28.4	0.899
8	17 7 28.61	2.4608	18 44 6.7	5.169	8	19 6 3.85	2.4469	20 24 30.6	1.026
9	17 9 56.31	2.4625	18 49 13.2	5.047	9	19 8 30.59	2.4444	20 23 25.2	1.153
10	17 12 24.11	2.4641	18 54 12.4	4.924	10	19 10 57.18	2.4419	20 22 12.2	1.280
11	17 14 52.00	2.4656	18 59 4.1	4.800	11	19 13 23.62	2.4393	20 20 51.6	1.406
12	17 17 19.98	2.4670	19 3 48.4	4.676	12	19 15 49.90	2.4367	20 19 23.5	1.531
13	17 19 48.04	2.4683	19 8 25.2	4.551	13	19 18 16.02	2.4339	20 17 47.9	1.656
14	17 22 16.18	2.4696	19 12 54.5	4.426	14	19 20 41.97	2.4310	20 16 4.8	1.781
15	17 24 44.40	2.4709	19 17 16.3	4.300	15	19 23 7.74	2.4280	20 14 14.2	1.905
16	17 27 12.69	2.4720	19 21 30.5	4.173	16	19 25 33.33	2.4250	20 12 16.2	2.028
17	17 29 41.04	2.4731	19 25 37.1	4.047	17	19 27 58.74	2.4219	20 10 10.9	2.150
18	17 32 9.46	2.4741	19 29 36.1	3.919	18	19 30 23.96	2.4188	20 7 58.2	2.272
19	17 34 37.94	2.4750	19 33 27.4	3.791	19	19 32 48.99	2.4156	20 5 38.2	2.393
20	17 37 6.46	2.4758	19 37 11.0	3.663	20	19 35 13.83	2.4123	20 3 11.0	2.514
21	17 39 35.03	2.4765	19 40 47.0	3.535	21	19 37 38.47	2.4089	20 0 36.5	2.635
22	17 42 3.64	2.4772	19 44 15.2	3.406	22	19 40 2.90	2.4054	19 57 54.8	2.754
23	17 44 32.29	2.4778	19 47 35.7	3.277	23	19 42 27.12	2.4019	19 55 6.0	2.873
24	17 47 0.97	2.4783	S. 19° 50' 48.4"	3.147	24	19 44 51.13	2.3983	S. 19° 52' 10.1"	2.991

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 13.					SUNDAY 15.				
0	<sup>h</sup> 19 <sup>m</sup> 44 <sup>s</sup> 51.13	2.3083	S. 19° 52' 10.1"	2.991	0	<sup>h</sup> 21 <sup>m</sup> 34 <sup>s</sup> 56.02	2.1775	S. 15° 29' 22.0"	7.587
1	19 47 14.92	2.3047	19 49 7.1	3.108	1	21 37 6.52	2.1798	15 21 44.6	7.658
2	19 49 38.49	2.3010	19 45 57.1	3.224	2	21 39 16.73	2.1677	15 14 3.0	7.728
3	19 52 1.84	2.3079	19 42 40.2	3.339	3	21 41 26.64	2.1697	15 6 17.2	7.798
4	19 54 24.96	2.3033	19 39 16.4	3.454	4	21 43 36.25	2.1577	14 58 27.3	7.868
5	19 56 47.84	2.3794	19 35 45.7	3.568	5	21 45 45.57	2.1598	14 50 33.3	7.938
6	19 59 10.49	2.3755	19 32 8.2	3.682	6	21 47 54.59	2.1479	14 42 35.4	7.998
7	20 1 32.90	2.3715	19 28 23.9	3.794	7	21 50 3.32	2.1430	14 34 33.5	8.064
8	20 3 55.07	2.3674	19 24 32.9	3.906	8	21 52 11.75	2.1381	14 26 27.7	8.198
9	20 6 16.99	2.3632	19 20 35.2	4.017	9	21 54 19.89	2.1332	14 18 18.1	8.199
10	20 8 38.66	2.3591	19 16 30.9	4.127	10	21 56 27.74	2.1284	14 10 4.7	8.253
11	20 11 0.08	2.3549	19 12 20.0	4.236	11	21 58 35.30	2.1236	14 1 47.7	8.313
12	20 13 21.25	2.3507	19 8 2.6	4.344	12	22 0 42.57	2.1188	13 53 27.1	8.373
13	20 15 42.16	2.3463	19 3 38.7	4.451	13	22 2 49.55	2.1140	13 45 2.9	8.433
14	20 18 2.81	2.3419	18 59 8.5	4.557	14	22 4 56.25	2.1092	13 36 35.1	8.492
15	20 20 23.19	2.3374	18 54 31.9	4.662	15	22 7 2.66	2.1045	13 28 3.9	8.548
16	20 22 43.30	2.3330	18 49 49.0	4.767	16	22 9 8.79	2.0998	13 19 29.3	8.604
17	20 25 3.15	2.3286	18 44 59.8	4.871	17	22 11 14.64	2.0952	13 10 51.4	8.659
18	20 27 22.73	2.3240	18 40 4.5	4.974	18	22 13 20.21	2.0905	13 2 10.2	8.713
19	20 29 42.03	2.3194	18 35 3.0	5.076	19	22 15 25.50	2.0858	12 53 25.8	8.767
20	20 32 1.06	2.3148	18 29 55.4	5.177	20	22 17 30.51	2.0812	12 44 38.2	8.819
21	20 34 19.81	2.3102	18 24 41.8	5.276	21	22 19 35.25	2.0767	12 35 47.5	8.870
22	20 36 38.28	2.3055	18 19 22.3	5.374	22	22 21 39.71	2.0720	12 26 53.8	8.920
23	20 38 56.47	2.3008	S. 18 13 56.9	5.471	23	22 23 43.91	2.0677	S. 12 17 57.1	8.969
SATURDAY 14.					MONDAY 16.				
0	20 41 14.38	2.2961	S. 18 8 25.7	5.568	0	22 25 47.84	2.0639	S. 12 8 57.5	9.018
1	20 43 32.00	2.2913	18 2 48.7	5.665	1	22 27 51.50	2.0587	11 59 55.0	9.066
2	20 45 49.33	2.2865	17 57 5.9	5.760	2	22 29 54.89	2.0543	11 50 49.6	9.112
3	20 48 6.38	2.2817	17 51 17.5	5.854	3	22 31 58.02	2.0499	11 41 41.5	9.157
4	20 50 23.14	2.2768	17 45 23.5	5.947	4	22 34 0.88	2.0456	11 32 30.7	9.202
5	20 52 39.60	2.2719	17 39 21.9	6.038	5	22 36 3.49	2.0413	11 23 17.2	9.246
6	20 54 55.77	2.2671	17 33 18.9	6.128	6	22 38 5.84	2.0371	11 14 1.2	9.289
7	20 57 11.65	2.2622	17 27 8.5	6.218	7	22 40 7.94	2.0329	11 4 42.6	9.331
8	20 59 27.23	2.2579	17 20 52.7	6.307	8	22 42 9.79	2.0287	10 55 21.5	9.372
9	21 1 42.52	2.2523	17 14 31.6	6.395	9	22 44 11.38	2.0245	10 45 58.0	9.412
10	21 3 57.51	2.2473	17 8 5.3	6.482	10	22 46 12.73	2.0204	10 36 32.1	9.452
11	21 6 12.20	2.2424	17 1 33.8	6.567	11	22 48 13.83	2.0163	10 27 3.8	9.491
12	21 8 26.60	2.2375	16 54 57.2	6.652	12	22 50 14.69	2.0123	10 17 33.2	9.528
13	21 10 40.70	2.2325	16 48 15.6	6.735	13	22 52 15.21	2.0083	10 8 0.4	9.564
14	21 12 54.50	2.2275	16 41 29.0	6.818	14	22 54 15.69	2.0044	9 58 25.5	9.600
15	21 15 8.00	2.2225	16 34 37.4	6.900	15	22 56 15.84	2.0005	9 48 48.4	9.636
16	21 17 21.20	2.2175	16 27 41.0	6.980	16	22 58 15.75	1.9967	9 39 9.2	9.670
17	21 19 34.10	2.2125	16 20 39.8	7.060	17	23 0 15.44	1.9929	9 29 28.0	9.703
18	21 21 46.70	2.2075	16 13 33.8	7.139	18	23 2 14.90	1.9891	9 19 44.9	9.735
19	21 23 59.00	2.2025	16 6 23.1	7.217	19	23 4 14.13	1.9854	9 9 59.8	9.767
20	21 26 11.00	2.1976	15 59 7.8	7.293	20	23 6 13.15	1.9818	9 0 12.9	9.798
21	21 28 22.71	2.1926	15 51 48.0	7.367	21	23 8 11.95	1.9782	8 50 24.1	9.828
22	21 30 34.12	2.1876	15 44 23.8	7.441	22	23 10 10.53	1.9746	8 40 33.5	9.857
23	21 32 45.22	2.1826	15 36 55.1	7.515	23	23 12 8.90	1.9710	8 30 41.2	9.886
24	21 34 56.02	2.1775	S. 15 29 22.0	7.587	24	23 14 7.05	1.9675	S. 8 20 47.2	9.914

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 17.					THURSDAY 19.				
0	<sup>h</sup> 23 <sup>m</sup> 14 <sup>s</sup> 7.05	1.9675	S. 8° 20' 47.2"	9.914	0	<sup>h</sup> 0 45 <sup>m</sup> 31.63	1.8619	S. 0° 6' 44.4"	10.490
1	23 16 5.00	1.9641	8 10 51.5	9.941	1	0 47 23.32	1.8611	N. 0 3 40.7	10.416
2	23 18 2.75	1.9607	8 0 54.3	9.966	2	0 49 14.96	1.8602	0 14 5.5	10.410
3	23 20 0.29	1.9573	7 50 55.6	9.991	3	0 51 6.55	1.8595	0 24 29.9	10.403
4	23 21 57.63	1.9541	7 40 55.4	10.016	4	0 52 58.10	1.8588	0 34 53.9	10.397
5	23 23 54.78	1.9509	7 30 53.7	10.040	5	0 54 49.61	1.8582	0 45 17.5	10.390
6	23 25 51.74	1.9477	7 20 50.6	10.063	6	0 56 41.08	1.8576	0 55 40.7	10.382
7	23 27 48.51	1.9446	7 10 46.1	10.086	7	0 58 32.52	1.8571	1 6 3.4	10.374
8	23 29 45.09	1.9414	7 0 40.3	10.107	8	1 0 23.93	1.8567	1 16 25.6	10.366
9	23 31 41.48	1.9384	6 50 33.3	10.128	9	1 2 15.32	1.8563	1 26 47.3	10.357
10	23 33 37.70	1.9355	6 40 25.0	10.148	10	1 4 6.60	1.8559	1 37 8.5	10.348
11	23 35 33.74	1.9325	6 30 15.5	10.167	11	1 5 58.03	1.8555	1 47 29.1	10.338
12	23 37 29.60	1.9296	6 20 4.9	10.186	12	1 7 49.35	1.8553	1 57 49.1	10.328
13	23 39 25.29	1.9268	6 9 53.2	10.204	13	1 9 40.66	1.8552	2 8 8.4	10.316
14	23 41 20.82	1.9241	5 59 40.5	10.221	14	1 11 31.97	1.8551	2 18 27.0	10.303
15	23 43 16.18	1.9214	5 49 26.7	10.237	15	1 13 23.27	1.8550	2 28 44.8	10.291
16	23 45 11.38	1.9187	5 39 12.0	10.253	16	1 15 14.57	1.8550	2 39 1.9	10.278
17	23 47 6.42	1.9160	5 28 56.3	10.269	17	1 17 5.87	1.8550	2 49 18.2	10.264
18	23 49 1.30	1.9134	5 18 39.7	10.283	18	1 18 57.17	1.8551	2 59 33.6	10.250
19	23 50 56.03	1.9109	5 8 22.3	10.297	19	1 20 48.48	1.8552	3 9 48.2	10.236
20	23 52 50.61	1.9085	4 58 4.1	10.310	20	1 22 39.80	1.8555	3 20 2.0	10.222
21	23 54 45.05	1.9061	4 47 45.1	10.322	21	1 24 31.14	1.8558	3 30 14.8	10.206
22	23 56 39.34	1.9037	4 37 25.4	10.333	22	1 26 22.50	1.8561	3 40 26.7	10.190
23	23 58 33.49	1.9014	S. 4 27 5.1	10.344	23	1 28 13.87	1.8564	N. 3 50 37.6	10.173
WEDNESDAY 18.					FRIDAY 20.				
0	0 0 27.51	1.8992	S. 4 16 44.1	10.355	0	1 30 5.26	1.8567	N. 4 0 47.4	10.155
1	0 2 21.40	1.8970	4 6 22.5	10.365	1	1 31 56.68	1.8572	4 10 56.2	10.138
2	0 4 15.15	1.8948	3 56 0.3	10.374	2	1 33 48.13	1.8578	4 21 3.9	10.120
3	0 6 8.77	1.8927	3 45 37.6	10.383	3	1 35 39.62	1.8585	4 31 10.6	10.102
4	0 8 2.27	1.8907	3 35 14.4	10.391	4	1 37 31.15	1.8592	4 41 16.1	10.082
5	0 9 55.66	1.8888	3 24 50.7	10.398	5	1 39 22.72	1.8599	4 51 20.4	10.061
6	0 11 48.93	1.8869	3 14 26.6	10.404	6	1 41 14.33	1.8606	5 1 23.4	10.040
7	0 13 42.08	1.8850	3 4 2.2	10.410	7	1 43 5.99	1.8614	5 11 25.2	10.019
8	0 15 35.13	1.8832	2 53 37.4	10.416	8	1 44 57.70	1.8622	5 21 25.7	9.997
9	0 17 28.07	1.8814	2 43 12.3	10.420	9	1 46 49.46	1.8632	5 31 24.9	9.976
10	0 19 20.90	1.8797	2 32 47.0	10.424	10	1 48 41.28	1.8642	5 41 22.8	9.954
11	0 21 13.64	1.8781	2 22 21.4	10.428	11	1 50 33.16	1.8652	5 51 19.4	9.932
12	0 23 6.28	1.8765	2 11 55.6	10.431	12	1 52 25.10	1.8662	6 1 14.6	9.908
13	0 24 58.82	1.8749	2 1 29.7	10.433	13	1 54 17.11	1.8674	6 11 8.3	9.883
14	0 26 51.27	1.8735	1 51 3.7	10.435	14	1 56 9.19	1.8686	6 21 0.5	9.858
15	0 28 43.64	1.8722	1 40 37.5	10.437	15	1 58 1.34	1.8698	6 30 51.3	9.833
16	0 30 35.93	1.8708	1 30 11.3	10.437	16	1 59 53.57	1.8711	6 40 40.5	9.807
17	0 32 28.14	1.8695	1 19 45.1	10.436	17	2 1 45.88	1.8724	6 50 28.1	9.780
18	0 34 20.27	1.8682	1 9 19.0	10.435	18	2 3 38.26	1.8737	7 0 14.1	9.753
19	0 36 12.32	1.8670	0 58 52.9	10.434	19	2 5 30.73	1.8752	7 9 58.5	9.726
20	0 38 4.31	1.8659	0 48 26.9	10.433	20	2 7 23.29	1.8767	7 19 41.2	9.698
21	0 39 56.23	1.8648	0 38 1.0	10.431	21	2 9 15.94	1.8783	7 29 22.2	9.669
22	0 41 48.09	1.8638	0 27 35.2	10.428	22	2 11 8.69	1.8800	7 39 1.5	9.641
23	0 43 39.89	1.8628	0 17 9.7	10.424	23	2 13 1.54	1.8816	7 48 39.1	9.612
24	0 45 31.63	1.8619	S. 0 6 44.4	10.420	24	2 14 54.48	1.8833	N. 7 58 14.9	9.582

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 21.					MONDAY 23.				
0	2 14 54.48	1.8833	N. 7 58 14.9	9.582	0	3 48 10.23	2.0189	N. 14 51 59.8	7.417
1	2 16 47.53	1.8851	8 7 48.9	9.551	1	3 50 11.47	2.0226	14 59 23.0	7.355
2	2 18 40.69	1.8868	8 17 21.0	9.519	2	3 52 12.94	2.0264	15 6 42.4	7.293
3	2 20 33.95	1.8887	8 26 51.2	9.486	3	3 54 14.64	2.0302	15 13 58.1	7.230
4	2 22 27.33	1.8907	8 36 19.4	9.453	4	3 56 16.56	2.0340	15 21 10.0	7.167
5	2 24 20.83	1.8926	8 45 45.6	9.420	5	3 58 18.72	2.0379	15 28 18.1	7.103
6	2 26 14.44	1.8946	8 55 9.8	9.387	6	4 0 21.11	2.0418	15 35 22.4	7.038
7	2 28 8.18	1.8967	9 4 32.0	9.353	7	4 2 23.73	2.0457	15 42 22.7	6.973
8	2 30 2.04	1.8988	9 13 52.1	9.318	8	4 4 26.59	2.0497	15 49 19.1	6.907
9	2 31 56.03	1.9009	9 23 10.2	9.283	9	4 6 29.69	2.0536	15 56 11.5	6.839
10	2 33 50.15	1.9032	9 32 26.1	9.247	10	4 8 33.02	2.0575	16 2 59.8	6.771
11	2 35 44.41	1.9054	9 41 39.8	9.210	11	4 10 36.59	2.0615	16 9 44.0	6.702
12	2 37 38.80	1.9077	9 50 51.3	9.173	12	4 12 40.40	2.0655	16 16 24.1	6.633
13	2 39 33.33	1.9100	10 0 0.5	9.135	13	4 14 44.45	2.0696	16 23 0.0	6.563
14	2 41 28.00	1.9124	10 9 7.5	9.097	14	4 16 48.75	2.0737	16 29 31.7	6.492
15	2 43 22.82	1.9149	10 18 12.2	9.058	15	4 18 53.29	2.0777	16 35 59.1	6.421
16	2 45 17.79	1.9174	10 27 14.5	9.018	16	4 20 58.07	2.0817	16 42 22.2	6.349
17	2 47 12.91	1.9199	10 36 14.4	8.978	17	4 23 3.10	2.0858	16 48 41.0	6.277
18	2 49 8.18	1.9225	10 45 11.9	8.937	18	4 25 8.37	2.0899	16 54 55.4	6.203
19	2 51 3.61	1.9252	10 54 6.9	8.896	19	4 27 13.89	2.0941	17 1 5.3	6.128
20	2 52 59.20	1.9278	11 2 59.4	8.854	20	4 29 19.66	2.0982	17 7 10.7	6.053
21	2 54 54.94	1.9304	11 11 49.4	8.811	21	4 31 25.67	2.1023	17 13 11.6	5.976
22	2 56 50.85	1.9332	11 20 36.8	8.768	22	4 33 31.93	2.1065	17 19 7.9	5.899
23	2 58 46.93	1.9361	N. 11 29 21.6	8.725	23	4 35 38.45	2.1107	N. 17 24 59.5	5.822
SUNDAY 22.					TUESDAY 24.				
0	3 0 43.18	1.9389	N. 11 38 3.8	8.681	0	4 37 45.22	2.1149	N. 17 30 46.5	5.744
1	3 2 39.60	1.9418	11 46 43.3	8.635	1	4 39 52.24	2.1191	17 36 28.8	5.665
2	3 4 36.20	1.9447	11 55 20.0	8.589	2	4 41 59.51	2.1233	17 42 6.3	5.585
3	3 6 32.97	1.9477	12 3 54.0	8.543	3	4 44 7.02	2.1273	17 47 39.0	5.504
4	3 8 29.92	1.9507	12 12 25.2	8.496	4	4 46 14.78	2.1315	17 53 6.8	5.423
5	3 10 27.05	1.9538	12 20 53.5	8.448	5	4 48 22.80	2.1357	17 58 29.7	5.341
6	3 12 24.37	1.9569	12 29 19.0	8.400	6	4 50 31.07	2.1399	18 3 47.7	5.258
7	3 14 21.88	1.9600	12 37 41.5	8.351	7	4 52 39.59	2.1441	18 9 0.7	5.174
8	3 16 19.57	1.9631	12 46 1.1	8.302	8	4 54 48.36	2.1482	18 14 8.6	5.089
9	3 18 17.45	1.9663	12 54 17.7	8.251	9	4 56 57.38	2.1524	18 19 11.4	5.004
10	3 20 15.53	1.9696	13 2 31.2	8.200	10	4 59 6.65	2.1567	18 24 9.1	4.918
11	3 22 13.81	1.9729	13 10 41.7	8.149	11	5 1 16.18	2.1609	18 29 1.6	4.832
12	3 24 12.28	1.9762	13 18 49.1	8.097	12	5 3 25.96	2.1651	18 33 48.9	4.744
13	3 26 10.95	1.9796	13 26 53.4	8.044	13	5 5 35.09	2.1692	18 38 30.9	4.656
14	3 28 9.83	1.9831	13 34 54.4	7.990	14	5 7 46.27	2.1733	18 43 7.6	4.567
15	3 30 8.92	1.9865	13 42 52.2	7.936	15	5 9 56.79	2.1774	18 47 39.0	4.477
16	3 32 8.21	1.9899	13 50 46.7	7.881	16	5 12 7.56	2.1816	18 52 4.9	4.387
17	3 34 7.71	1.9934	13 58 37.9	7.825	17	5 14 18.58	2.1857	18 56 25.4	4.296
18	3 36 7.42	1.9970	14 6 25.7	7.769	18	5 16 29.85	2.1899	19 0 40.4	4.204
19	3 38 7.35	2.0006	14 14 10.1	7.713	19	5 18 41.37	2.1940	19 4 49.9	4.112
20	3 40 7.49	2.0041	14 21 51.1	7.654	20	5 20 53.13	2.1980	19 8 53.8	4.018
21	3 42 7.84	2.0077	14 29 28.6	7.596	21	5 23 5.13	2.2020	19 12 52.0	3.924
22	3 44 8.41	2.0114	14 37 2.6	7.537	22	5 25 17.37	2.2061	19 16 44.6	3.829
23	3 46 9.21	2.0152	14 44 33.0	7.477	23	5 27 29.86	2.2102	19 20 31.5	3.733
24	3 48 10.23	2.0189	N. 14 51 59.8	7.417	24	5 29 42.59	2.2142	N. 19 24 12.6	3.637



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 25.					FRIDAY 27.				
0	5 29 42.59	2.9142	N.19° 24' 12.6"	3.637	0	7 19 54.55	2.3586	N.20° 15' 56.3"	1.673
1	5 31 55.56	2.9181	19 27 47.9	3.540	1	7 22 16.12	2.3602	20 14 12.3	1.793
2	5 34 8.76	2.9220	19 31 17.4	3.443	2	7 24 37.78	2.3618	20 12 21.1	1.913
3	5 36 22.20	2.9260	19 34 41.0	3.343	3	7 26 59.54	2.3634	20 10 22.7	2.034
4	5 38 35.88	2.9299	19 37 58.6	3.244	4	7 29 21.39	2.3648	20 8 17.0	2.155
5	5 40 49.79	2.9337	19 41 10.3	3.145	5	7 31 43.32	2.3662	20 6 4.1	2.275
6	5 43 3.93	2.9376	19 44 16.0	3.045	6	7 34 5.33	2.3675	20 3 44.0	2.396
7	5 45 18.30	2.9414	19 47 15.7	2.943	7	7 36 27.42	2.3687	20 1 16.6	2.517
8	5 47 32.90	2.9452	19 50 9.2	2.841	8	7 38 49.57	2.3698	19 58 42.0	2.637
9	5 49 47.73	2.9490	19 52 56.6	2.738	9	7 41 11.79	2.3708	19 56 0.2	2.757
10	5 52 2.78	2.9527	19 55 37.8	2.635	10	7 43 34.07	2.3719	19 53 11.1	2.878
11	5 54 18.05	2.9563	19 58 12.8	2.533	11	7 45 56.42	2.3730	19 50 14.8	2.999
12	5 56 33.54	2.9600	20 0 41.6	2.437	12	7 48 18.83	2.3739	19 47 11.2	3.120
13	5 58 49.25	2.9636	20 3 4.1	2.339	13	7 50 41.29	2.3747	19 44 0.4	3.240
14	6 1 5.17	2.9673	20 5 20.2	2.241	14	7 53 3.79	2.3754	19 40 42.4	3.361
15	6 3 21.31	2.9707	20 7 30.0	2.140	15	7 55 26.33	2.3760	19 37 17.1	3.482
16	6 5 37.66	2.9742	20 9 33.4	2.003	16	7 57 48.91	2.3767	19 33 44.6	3.603
17	6 7 54.22	2.9777	20 11 30.3	1.895	17	8 0 11.53	2.3773	19 30 4.9	3.722
18	6 10 10.98	2.9811	20 13 20.8	1.787	18	8 2 34.18	2.3777	19 26 18.0	3.843
19	6 12 27.95	2.9845	20 15 4.8	1.678	19	8 4 56.85	2.3781	19 22 23.9	3.963
20	6 14 45.12	2.9878	20 16 42.2	1.568	20	8 7 19.55	2.3785	19 18 22.6	4.082
21	6 17 2.48	2.9910	20 18 13.0	1.459	21	8 9 42.27	2.3788	19 14 14.1	4.201
22	6 19 20.04	2.9949	20 19 37.3	1.349	22	8 12 5.00	2.3790	19 9 58.5	4.319
23	6 21 37.79	2.9974	N.20° 20' 54.9"	1.238	23	8 14 27.75	2.3792	N.19° 5' 35.8"	4.438
THURSDAY 26.					SATURDAY 28.				
0	6 23 55.73	2.3006	N.20° 22' 5.8"	1.126	0	8 16 50.51	2.3793	N.19° 1' 5.9"	4.557
1	6 26 13.86	2.3037	20 23 10.0	1.014	1	8 19 13.27	2.3793	18 56 28.9	4.676
2	6 28 32.17	2.3067	20 24 7.5	0.901	2	8 21 36.03	2.3793	18 51 44.8	4.793
3	6 30 50.66	2.3097	20 24 58.2	0.788	3	8 23 58.78	2.3799	18 46 53.7	4.910
4	6 33 9.33	2.3126	20 25 42.1	0.675	4	8 26 21.53	2.3790	18 41 55.6	5.028
5	6 35 28.17	2.3154	20 26 19.2	0.562	5	8 28 44.26	2.3787	18 36 50.4	5.145
6	6 37 47.18	2.3183	20 26 49.5	0.448	6	8 31 6.98	2.3785	18 31 38.2	5.261
7	6 40 6.36	2.3211	20 27 12.9	0.333	7	8 33 29.68	2.3782	18 26 19.1	5.377
8	6 42 25.71	2.3238	20 27 29.4	0.217	8	8 35 52.36	2.3778	18 20 53.0	5.493
9	6 44 45.22	2.3264	20 27 38.9	+ 0.101	9	8 38 15.01	2.3773	18 15 19.9	5.609
10	6 47 4.88	2.3289	20 27 41.5	- 0.015	10	8 40 37.64	2.3768	18 9 39.9	5.723
11	6 49 24.69	2.3314	20 27 37.1	0.139	11	8 43 0.23	2.3763	18 3 53.1	5.837
12	6 51 44.65	2.3339	20 27 25.7	0.262	12	8 45 22.79	2.3757	17 57 59.5	5.950
13	6 54 4.76	2.3364	20 27 7.3	0.385	13	8 47 45.31	2.3750	17 51 59.1	6.064
14	6 56 25.02	2.3388	20 26 41.9	0.483	14	8 50 7.79	2.3742	17 45 51.9	6.177
15	6 58 45.42	2.3411	20 26 9.4	0.601	15	8 52 30.22	2.3734	17 39 37.9	6.289
16	7 1 5.95	2.3439	20 25 29.8	0.719	16	8 54 52.60	2.3726	17 33 17.2	6.400
17	7 3 26.60	2.3463	20 24 43.1	0.837	17	8 57 14.93	2.3717	17 26 49.9	6.511
18	7 5 47.38	2.3474	20 23 49.3	0.956	18	8 59 37.21	2.3708	17 20 15.9	6.622
19	7 8 8.29	2.3485	20 22 48.4	1.075	19	9 1 59.43	2.3698	17 13 35.3	6.731
20	7 10 29.32	2.3514	20 21 40.3	1.194	20	9 4 21.59	2.3688	17 6 48.2	6.839
21	7 12 50.46	2.3533	20 20 25.1	1.313	21	9 6 43.69	2.3677	16 59 54.6	6.948
22	7 15 11.72	2.3552	20 19 2.7	1.433	22	9 9 5.72	2.3667	16 52 54.5	7.056
23	7 17 33.08	2.3569	20 17 33.1	1.553	23	9 11 27.69	2.3656	16 45 47.9	7.163
24	7 19 54.55	2.3586	N.20° 15' 56.3"	1.673	24	9 13 49.59	2.3644	N.16° 38' 34.9"	7.269

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.																									
SUNDAY 29.					TUESDAY 31.																													
0	9 13 49.59	2.3644	N. 16° 38' 34.9"	7.969	0	11 5 25.59	.9815	N. 9° 4' 25.8"	11.963																									
1	9 16 11.41	2.3631	16 31 15.6	7.374	1	11 7 42.42	2.9797	8 53 9.0	11.308																									
2	9 18 33.16	2.3618	16 23 50.0	7.479	2	11 9 59.16	2.9780	8 41 48.8	11.363																									
3	9 20 54.83	2.3605	16 16 18.1	7.583	3	11 12 15.79	2.9763	8 30 25.4	11.416																									
4	9 23 16.42	2.3591	16 8 40.0	7.686	4	11 14 32.32	2.9747	8 18 58.9	11.467																									
5	9 25 37.92	2.3577	16 0 55.8	7.789	5	11 16 48.75	2.9730	8 7 29.3	11.518																									
6	9 27 59.34	2.3563	15 53 5.4	7.891	6	11 19 5.08	2.9713	7 55 56.7	11.568																									
7	9 30 20.67	2.3548	15 45 8.9	7.991	7	11 21 21.31	2.9697	7 44 21.1	11.617																									
8	9 32 41.92	2.3534	15 37 6.5	8.090	8	11 23 37.45	2.9680	7 32 42.7	11.663																									
9	9 35 3.08	2.3518	15 28 58.1	8.189	9	11 25 53.49	2.9663	7 21 1.6	11.708																									
10	9 37 24.14	2.3509	15 20 43.8	8.287	10	11 28 9.44	2.9650	7 9 17.8	11.753																									
11	9 39 45.11	2.3487	15 12 23.6	8.385	11	11 30 25.29	2.9634	6 57 31.3	11.796																									
12	9 42 5.98	2.3471	15 3 57.6	8.481	12	11 32 41.05	2.9619	6 45 42.3	11.837																									
13	9 44 26.76	2.3454	14 55 25.9	8.577	13	11 34 56.72	2.9605	6 33 50.9	11.877																									
14	9 46 47.43	2.3437	14 46 48.4	8.679	14	11 37 12.31	2.9599	6 21 57.0	11.917																									
15	9 49 8.00	2.3420	14 38 5.3	8.785	15	11 39 27.82	2.9578	6 10 0.8	11.955																									
16	9 51 28.47	2.3403	14 29 16.6	8.857	16	11 41 43.25	2.9564	5 58 2.4	11.999																									
17	9 53 48.84	2.3386	14 20 22.4	8.949	17	11 43 58.59	2.9550	5 46 1.8	12.038																									
18	9 56 9.11	2.3369	14 11 22.7	9.040	18	11 46 13.85	2.9537	5 33 59.1	12.080																									
19	9 58 29.27	2.3351	14 2 17.6	9.129	19	11 48 29.04	2.9525	5 21 54.4	12.094																									
20	10 0 49.32	2.3333	13 53 7.2	9.218	20	11 50 44.15	2.9519	5 9 47.8	12.135																									
21	10 3 9.27	2.3316	13 43 51.5	9.306	21	11 52 59.18	2.9499	4 57 39.4	12.185																									
22	10 5 29.11	2.3297	13 34 30.5	9.392	22	11 55 14.14	2.9487	4 45 29.2	12.194																									
23	10 7 48.83	2.3279	N. 13° 25' 4.4"	9.477	23	11 57 29.03	2.9476	N. 4° 33' 17.3"	12.219																									
MONDAY 30.					WEDNESDAY, FEBRUARY 1.																													
0	10 10 8.45	2.3261	N. 13° 15' 33.2"	9.562	0	11 59 43.86	2.9466	N. 4° 21' 3.7"	12.239																									
1	10 12 27.96	2.3242	13 5 56.9	9.646	PHASES OF THE MOON.																													
2	10 14 47.35	2.3223	12 56 15.7	9.729																														
3	10 17 6.63	2.3204	12 46 29.6	9.809																														
4	10 19 25.80	2.3186	12 36 38.6	9.890																														
5	10 21 44.86	2.3167	12 26 42.8	9.969	<table><tr><td></td><td></td><td>d</td><td>h</td><td>m</td></tr><tr><td>☾</td><td>Last Quarter . . . Jan.</td><td>5</td><td>23</td><td>42.4</td></tr><tr><td>●</td><td>New Moon. . . . .</td><td>12</td><td>20</td><td>38.6</td></tr><tr><td>☾</td><td>First Quarter . . . .</td><td>20</td><td>16</td><td>49.1</td></tr><tr><td>○</td><td>Full Moon . . . . .</td><td>28</td><td>11</td><td>18.9</td></tr></table>							d	h	m	☾	Last Quarter . . . Jan.	5	23	42.4	●	New Moon. . . . .	12	20	38.6	☾	First Quarter . . . .	20	16	49.1	○	Full Moon . . . . .	28	11	18.9
		d	h	m																														
☾	Last Quarter . . . Jan.	5	23	42.4																														
●	New Moon. . . . .	12	20	38.6																														
☾	First Quarter . . . .	20	16	49.1																														
○	Full Moon . . . . .	28	11	18.9																														
6	10 24 3.81	2.3148	12 16 42.3	10.047	<table><tr><td></td><td></td><td>d</td><td>h</td><td>m</td></tr><tr><td>☾</td><td>Perigee . . . . . Jan.</td><td>8</td><td>0</td><td></td></tr><tr><td>☾</td><td>Apogee . . . . .</td><td>20</td><td>12.1</td><td></td></tr></table>							d	h	m	☾	Perigee . . . . . Jan.	8	0		☾	Apogee . . . . .	20	12.1											
		d	h	m																														
☾	Perigee . . . . . Jan.	8	0																															
☾	Apogee . . . . .	20	12.1																															
7	10 26 22.64	2.3129	12 6 37.1	10.124																														
8	10 28 41.36	2.3111	11 56 27.4	10.199																														
9	10 30 59.97	2.3092	11 46 13.2	10.274																														
10	10 33 18.46	2.3079	11 35 54.5	10.347																														
11	10 35 36.84	2.3053	11 25 31.5	10.419																														
12	10 37 55.10	2.3034	11 15 4.2	10.490																														
13	10 40 13.25	2.3016	11 4 32.7	10.561																														
14	10 42 31.29	2.2997	10 53 56.9	10.631																														
15	10 44 49.22	2.2979	10 43 17.0	10.698																														
16	10 47 7.04	2.2960	10 32 33.1	10.764																														
17	10 49 24.74	2.2941	10 21 45.3	10.829																														
18	10 51 42.33	2.2923	10 10 53.6	10.893																														
19	10 53 59.82	2.2905	9 59 58.1	10.957																														
20	10 56 17.19	2.2886	9 48 58.8	11.018																														
21	10 58 34.45	2.2868	9 37 55.9	11.078																														
22	11 0 51.60	2.2850	9 26 49.4	11.138																														
23	11 3 8.65	2.2839	9 15 39.3	11.197																														
24	11 5 25.59	2.2815	N. 9° 4' 25.8"	11.253																														

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III.	P. L. of Diff.	VI.	P. L. of Diff.	IX.	P. L. of Diff.
1	Aldebaran W.	58° 41' 7"	9519	60° 22' 4"	9504	62° 3' 12"	9496	63° 44' 31"	9489
	Mars E.	66 8 27	9666	64 31 1	9657	62 53 24	9649	61 15 36	9642
	Spica E.	75 29 32	9546	73 49 23	9539	72 9 4	9532	70 28 35	9525
	Venus E.	109 18 16	9903	107 46 1	9894	106 13 35	9886	104 40 58	9877
2	Aldebaran W.	72 13 37	9454	73 55 55	9448	75 38 22	9441	77 20 59	9434
	Pollux W.	29 5 23	9649	30 43 21	9618	32 21 52	9596	34 0 52	9577
	Mars E.	53 4 7	9607	51 25 21	9600	49 46 26	9593	48 7 22	9588
	Spica E.	62 4 0	9495	60 22 40	9491	58 41 14	9487	56 59 42	9482
	Venus E.	96 55 22	9841	95 21 47	9833	93 48 2	9826	92 14 8	9820
	Jupiter E.	97 31 11	9595	95 50 32	9518	94 9 44	9512	92 28 47	9505
3	Aldebaran W.	85 56 10	9405	87 39 37	9401	89 23 11	9395	91 6 53	9390
	Pollux W.	42 21 45	9504	44 2 53	9492	45 44 17	9489	47 25 56	9479
	Saturn W.	29 18 0	9385	31 1 56	9379	32 46 1	9374	34 30 13	9368
	Mars E.	39 50 2	9560	38 10 12	9555	36 30 15	9551	34 50 12	9546
	Spica E.	48 30 39	9406	46 48 38	9404	45 6 34	9402	43 24 28	9402
	Jupiter E.	84 1 52	9475	82 20 4	9470	80 38 9	9465	78 56 7	9460
	Venus E.	84 22 35	9768	82 47 52	9763	81 13 2	9778	79 38 5	9772
	Antares E.	94 24 39	9461	92 42 31	9456	91 0 16	9450	89 17 53	9445
	Sun E.	128 38 27	9745	127 2 47	9738	125 26 58	9732	123 51 1	9727
4	Pollux W.	55 57 22	9431	57 40 13	9424	59 23 14	9417	61 6 24	9411
	Saturn W.	43 13 7	9344	44 58 3	9339	46 43 5	9335	48 28 14	9331
	Regulus W.	19 40 4	9373	21 24 17	9367	23 8 39	9362	24 53 8	9357
	Spica E.	34 54 8	9472	33 12 15	9478	31 30 31	9466	29 48 58	9466
	Jupiter E.	70 24 11	9436	68 41 28	9431	66 58 38	9426	65 15 43	9424
	Venus E.	71 41 32	9747	70 5 54	9741	68 30 9	9737	66 54 18	9733
	Antares E.	80 44 15	9423	79 1 13	9419	77 18 6	9415	75 34 53	9412
	Sun E.	115 49 26	9699	114 12 45	9695	112 35 58	9689	110 59 4	9684
5	Pollux W.	69 44 23	9383	71 28 22	9378	73 12 28	9374	74 56 40	9369
	Saturn W.	57 15 31	9310	59 1 16	9306	60 47 7	9302	62 33 3	9298
	Regulus W.	33 37 17	9335	35 22 26	9331	37 7 41	9327	38 53 1	9323
	Jupiter E.	56 39 44	9405	54 56 17	9402	53 12 45	9399	51 29 9	9396
	Venus E.	58 53 38	9711	57 17 13	9707	55 40 43	9704	54 4 8	9700
	Antares E.	66 57 45	9399	65 14 9	9397	63 30 30	9395	61 46 48	9394
	Sun E.	102 53 0	9663	101 15 30	9658	99 37 54	9654	98 0 12	9649
6	Saturn W.	71 24 3	9362	73 10 29	9379	74 57 0	9376	76 43 35	9372
	Regulus W.	47 41 3	9306	49 26 54	9302	51 12 50	9300	52 58 50	9296
	Jupiter E.	42 50 14	9385	41 6 18	9384	39 22 20	9382	37 38 20	9380
	Venus E.	46 0 4	9694	44 23 2	9691	42 45 57	9678	41 8 48	9675
	Antares E.	53 8 5	9394	51 24 22	9396	49 40 41	9387	47 57 2	9400
	Sun E.	89 50 23	9632	88 12 11	9628	86 33 54	9625	84 55 33	9621
7	Saturn W.	85 37 33	9260	87 24 31	9258	89 11 33	9256	90 58 37	9254
	Regulus W.	61 49 53	9264	63 36 16	9261	65 22 43	9260	67 9 12	9276
	Mars W.	14 44 26	9481	16 26 6	9466	18 8 7	9455	19 50 24	9446
	Venus E.	33 2 16	9696	31 24 50	9695	29 47 23	9684	28 9 55	9685
	Antares E.	39 20 17	9430	37 37 25	9440	35 54 47	9453	34 12 27	9467
	Sun E.	76 42 47	9608	75 4 3	9606	73 25 16	9604	71 46 26	9601

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Aldebaran W.	65° 26' 0"	9481	67° 7' 40"	9474	68° 49' 30"	9467	70° 31' 29"	9461
	MARS E.	59 37 38	9635	57 59 30	9637	56 21 12	9630	54 42 44	9613
	Spica E.	68 47 57	9590	67 7 11	9513	65 26 16	9507	63 45 12	9501
	VENUS E.	103 8 10	9869	101 35 12	9869	100 2 5	9855	98 28 48	9848
2	Aldebaran W.	79 3 45	9499	80 46 39	9493	82 29 41	9417	84 12 51	9411
	Pollux W.	35 40 18	9560	37 20 8	9544	39 0 20	9509	40 40 53	9515
	MARS E.	46 28 10	9581	44 48 49	9576	43 9 21	9570	41 29 45	9565
	Spica E.	55 18 4	9478	53 36 20	9475	51 54 31	9471	50 12 37	9468
	VENUS E.	90 40 6	9814	89 5 56	9807	87 31 37	9801	85 57 10	9795
	JUPITER E.	90 47 41	9499	89 6 26	9493	87 25 3	9467	85 43 32	9461
3	Aldebaran W.	92 50 42	9384	94 34 39	9380	96 18 43	9375	98 2 53	9371
	Pollux W.	49 7 49	9463	50 49 54	9454	52 32 12	9445	54 14 42	9438
	SATURN W.	36 14 33	9369	37 59 1	9358	39 43 36	9353	41 28 18	9348
	MARS E.	33 10 3	9542	31 29 48	9538	29 49 28	9535	28 9 4	9533
	Spica E.	41 42 21	9462	40 0 15	9463	38 18 10	9465	36 36 7	9467
	JUPITER E.	77 13 58	9455	75 31 41	9450	73 49 18	9445	72 6 48	9441
	VENUS E.	78 3 0	9766	76 27 48	9761	74 52 29	9756	73 17 4	9751
	Antares E.	87 35 23	9441	85 52 46	9436	84 10 2	9431	82 27 12	9426
	SUN E.	122 14 57	9791	120 38 45	9716	119 2 26	9710	117 26 0	9704
4	Pollux W.	62 49 43	9405	64 33 11	9399	66 16 47	9394	68 0 31	9388
	SATURN W.	50 13 29	9396	51 58 50	9399	53 44 18	9317	55 29 52	9314
	Regulus W.	26 37 44	9353	28 22 27	9348	30 7 17	9343	31 52 14	9339
	Spica E.	28 7 39	9509	26 26 38	9505	24 46 1	9548	23 5 54	9577
	JUPITER E.	63 32 42	9419	61 49 35	9416	60 6 23	9413	58 23 6	9409
	VENUS E.	65 18 22	9799	63 42 20	9794	62 6 12	9719	60 29 58	9715
	Antares E.	73 51 36	9409	72 8 14	9406	70 24 48	9403	68 41 18	9401
	SUN E.	109 22 3	9680	107 44 56	9675	106 7 43	9671	104 30 24	9667
5	Pollux W.	76 40 59	9365	78 25 24	9361	80 9 55	9357	81 54 31	9353
	SATURN W.	64 19 5	9395	66 5 12	9391	67 51 24	9388	69 37 41	9385
	Regulus W.	40 38 27	9390	42 23 58	9315	44 9 35	9319	45 55 17	9309
	JUPITER E.	49 45 29	9394	48 1 46	9391	46 17 59	9389	44 34 8	9387
	VENUS E.	52 27 28	9697	50 50 44	9693	49 13 55	9690	47 37 2	9687
	Antares E.	60 3 5	9394	58 19 21	9393	56 35 36	9392	54 51 50	9393
	SUN E.	96 22 24	9646	94 44 31	9642	93 6 33	9638	91 28 30	9635
6	SATURN W.	78 30 15	9370	80 16 59	9367	82 3 47	9365	83 50 38	9369
	Regulus W.	54 44 55	9394	56 31 4	9391	58 17 17	9389	60 3 33	9386
	JUPITER E.	35 54 20	9389	34 10 20	9389	32 26 20	9383	30 42 21	9385
	VENUS E.	39 31 35	9673	37 54 19	9672	36 17 1	9669	34 39 40	9667
	Antares E.	46 13 27	9404	44 29 58	9408	42 46 35	9415	41 3 21	9422
	SUN E.	83 17 7	9618	81 38 37	9616	80 0 4	9613	78 21 27	9611
	SATURN W.	92 45 44	9252	94 32 54	9251	96 20 6	9250	98 7 19	9249
	Regulus W.	68 55 44	9276	70 42 19	9274	72 28 56	9274	74 15 34	9273
	MARS W.	21 32 53	9440	23 15 31	9434	24 58 17	9439	26 41 10	9425
	VENUS E.	26 32 28	9665	24 55 1	9666	23 17 35	9666	21 40 10	9669
	Antares E.	32 30 28	9485	30 48 53	9506	29 7 48	9533	27 27 20	9566
	SUN E.	70 7 33	9600	68 28 38	9599	66 49 41	9597	65 10 42	9596

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Dig.	III <sup>h</sup> .	P. L. of Dig.	VI <sup>h</sup> .	P. L. of Dig.	IX <sup>h</sup> .	P. L. of Dig.
8	Regulus W.	76 2 13	2979	77 48 54	2971	79 35 36	2970	81 22 20	2970
	Mars W.	28 24 9	2982	30 7 12	2919	31 50 19	2917	33 33 29	2916
	Spica W.	23 10 0	2977	24 51 46	2950	26 34 9	2939	28 17 2	2919
	Sun E.	63 31 41	2965	61 52 39	2964	60 13 36	2964	58 34 33	2963
9	Mars W.	42 9 44	2913	43 53 0	2914	45 36 15	2915	47 19 20	2916
	Spica W.	36 56 28	2900	38 41 0	2955	40 25 39	2951	42 10 24	2946
	Sun E.	50 19 19	2967	48 40 20	2969	47 1 23	2900	45 22 28	2908
10	Mars W.	55 54 59	2988	57 37 54	2931	59 20 44	2936	61 3 28	2940
	Spica W.	50 54 55	2944	52 39 50	2946	54 24 43	2948	56 9 33	2950
	Sun E.	37 8 48	2918	35 30 18	2934	33 51 55	2938	32 13 38	2933
14	Sun W.	14 7 3	2946	15 38 23	2957	17 9 30	2968	18 40 23	2980
	$\alpha$ Arietis E.	88 9 35	2732	86 33 38	2746	84 57 59	2760	83 22 39	2775
	Aldebaran E.	120 9 16	2577	118 29 50	2591	116 50 42	2604	115 11 53	2618
15	Sun W.	26 10 45	3046	27 39 58	3063	29 8 53	3077	30 37 31	3091
	$\alpha$ Arietis E.	75 30 55	2953	73 57 36	2999	72 24 38	2987	70 52 2	2993
	Aldebaran E.	107 2 23	2987	105 25 25	2700	103 48 45	2714	102 12 24	2728
16	Sun W.	37 56 16	3163	39 23 9	3178	40 49 45	3192	42 16 4	3205
	$\alpha$ Arietis E.	63 14 37	2995	61 44 18	3014	60 14 22	3034	58 44 51	3054
	Aldebaran E.	94 15 11	2796	92 40 38	2809	91 6 22	2822	89 32 23	2835
17	Sun W.	49 23 37	2979	50 48 21	2985	52 12 50	2997	53 37 5	3008
	$\alpha$ Arietis E.	51 23 39	3163	49 56 45	3187	48 30 20	3212	47 4 25	3237
	Aldebaran E.	81 46 35	2957	80 14 12	2999	78 42 4	2986	77 10 11	2991
18	Sun W.	60 35 3	3363	61 58 2	3373	63 20 50	3382	64 43 27	3391
	$\alpha$ Arietis E.	40 2 56	3389	38 40 27	3496	37 18 40	3467	35 57 39	3510
	Aldebaran E.	69 34 5	2981	68 3 29	2990	66 33 4	2999	65 2 50	3007
19	Sun W.	71 34 12	3486	72 55 57	3434	74 17 35	3439	75 39 7	3445
	Fomalhaut W.	40 31 6	3652	41 48 44	3683	43 6 54	3597	44 25 32	3574
	Aldebaran E.	57 34 1	3041	56 4 39	3047	54 35 24	3052	53 6 16	3058
20	Sun W.	82 25 32	3463	83 46 38	3463	85 7 43	3464	86 28 47	3465
	Fomalhaut W.	51 4 24	3483	52 25 7	3499	53 46 6	3455	55 7 20	3449
	$\alpha$ Pegasi W.	38 38 19	4106	39 48 15	4045	40 59 10	3990	42 10 59	3941
	Aldebaran E.	45 41 52	3073	44 13 9	3074	42 44 28	3076	41 15 49	3078
21	Sun W.	93 14 4	3492	94 35 11	3459	95 56 21	3455	97 17 35	3451
	Fomalhaut W.	61 56 55	3386	63 19 28	3376	64 42 12	3385	66 5 8	3355
	$\alpha$ Pegasi W.	48 21 26	3744	49 37 27	3712	50 54 1	3689	52 11 7	3655
	Aldebaran E.	33 52 38	3073	32 23 56	3071	30 55 11	3069	29 26 23	3065
	Pollux E.	78 14 33	3119	76 46 46	3118	75 18 58	3116	73 51 8	3114
	SATURN E.	89 6 45	3043	87 37 25	3040	86 8 2	3038	84 38 36	3034
22	Sun W.	104 5 0	3495	105 26 48	3419	106 48 43	3411	108 10 47	3403
	Fomalhaut W.	73 2 42	3396	74 26 47	3395	75 51 4	3385	77 15 33	3376
	$\alpha$ Pegasi W.	58 43 30	3536	60 3 14	3515	61 23 21	3495	62 43 51	3476

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## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XV <sup>b</sup>	P. L. of Diff.	XVIII <sup>b</sup>	P. L. of Diff.	XXI <sup>b</sup>	P. L. of Diff.
8	Regulus W.	83° 9' 4"	2270	84° 55' 48"	2270	86° 42' 31"	2271	88° 29' 13"	2272
	Mars W.	35 16 41	2415	36 59 55	2413	38 43 11	2413	40 26 27	2412
	Spica W.	30 0 20	2397	31 43 59	2385	33 27 55	2375	35 12 6	2367
	Sun E.	56 55 29	2503	55 16 25	2504	53 37 22	2505	51 58 20	2506
9	Mars W.	49 2 41	2418	50 45 50	2420	52 28 56	2422	54 11 59	2424
	Spica W.	43 55 14	2346	45 40 7	2344	47 25 3	2344	49 9 59	2344
	Sun E.	43 43 36	2605	42 4 48	2607	40 26 3	2611	38 47 23	2615
10	Mars W.	62 46 6	2445	64 28 37	2450	66 11 1	2455	67 53 18	2461
	Spica W.	57 54 20	2353	59 39 2	2357	61 23 39	2361	63 8 10	2365
	Sun E.	30 35 28	2630	28 57 26	2646	27 19 33	2652	25 41 49	2659
14	Sun W.	20 11 1	2993	21 41 23	3006	23 11 28	3021	24 41 15	3034
	α Arietis E.	81 47 38	2790	80 12 57	2805	78 38 36	2821	77 4 35	2837
	Aldebaran E.	113 33 22	2631	111 55 9	2645	110 17 15	2659	108 39 40	2673
15	Sun W.	32 5 51	3106	33 33 53	3120	35 1 38	3134	36 29 6	3149
	α Arietis E.	69 19 47	2921	67 47 55	2939	66 16 26	2958	64 45 20	2976
	Aldebaran E.	100 36 21	2741	99 0 36	2756	97 25 10	2769	95 50 2	2782
16	Sun W.	43 42 7	3220	45 7 53	3233	46 33 23	3246	47 58 38	3259
	α Arietis E.	57 15 45	3074	55 47 4	3096	54 18 49	3117	52 51 0	3140
	Aldebaran E.	87 58 41	2848	86 25 15	2861	84 52 6	2873	83 19 13	2885
17	Sun W.	55 1 7	3330	56 24 55	3332	57 48 30	3342	59 11 53	3353
	α Arietis E.	45 39 0	3265	44 14 7	3294	42 49 48	3324	41 26 4	3355
	Aldebaran E.	75 38 32	2942	74 7 6	2952	72 35 53	2962	71 4 53	2972
18	Sun W.	66 5 54	3400	67 28 11	3408	68 50 19	3415	70 12 19	3421
	α Arietis E.	34 37 26	3557	33 18 5	3610	31 59 41	3668	30 42 20	3734
	Aldebaran E.	63 32 46	3015	62 2 52	3022	60 33 7	3029	59 3 30	3035
19	Sun W.	77 0 33	3449	78 21 54	3453	79 43 11	3457	81 4 23	3460
	Fomalhaut W.	45 44 35	3552	47 4 2	3533	48 23 50	3515	49 43 58	3498
	Aldebaran E.	51 37 15	3062	50 8 19	3065	48 39 27	3068	47 10 38	3070
20	Sun W.	87 49 50	3465	89 10 53	3465	90 31 56	3465	91 52 59	3463
	Fomalhaut W.	56 28 49	3431	57 50 31	3419	59 12 26	3408	60 34 34	3396
	α Pegasi W.	43 23 37	3895	44 37 2	3852	45 51 11	3813	47 6 0	3777
	Aldebaran E.	39 47 12	3078	38 18 35	3077	36 49 57	3076	35 21 18	3075
21	Sun W.	98 38 54	3447	100 0 17	3443	101 21 45	3438	102 43 19	3431
	Fomalhaut W.	67 28 16	3345	68 51 35	3335	70 15 6	3325	71 38 48	3315
	α Pegasi W.	53 28 42	3829	54 46 45	3804	56 5 15	3781	57 24 10	3758
	Aldebaran E.	27 57 31	3061	26 28 34	3058	24 59 33	3053	23 30 26	3048
	Pollux E.	72 23 15	3110	70 55 18	3106	69 27 16	3103	67 59 10	3099
	Saturn E.	83 9 6	3030	81 39 31	3026	80 9 51	3022	78 40 5	3016
22	Sun W.	109 33 0	3395	110 55 22	3386	112 17 54	3378	113 40 36	3367
	Fomalhaut W.	78 40 13	3265	80 5 5	3254	81 30 10	3244	82 55 27	3234
	α Pegasi W.	64 4 42	3457	65 25 54	3438	66 47 27	3420	68 9 21	3402

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## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
22	Pollux	E.	66° 30' 59"	3095	65° 2' 43"	3090	63° 34' 21"	3084	62° 5' 52"	3079
	SATURN	E.	77 10 12	3010	75 40 12	3005	74 10 5	2998	72 39 50	2991
23	SUN	W.	115 3 30	3357	116 26 36	3347	117 49 53	3337	119 13 22	3325
	α Pegasi	W.	69 31 35	3386	70 54 8	3368	72 17 1	3351	73 40 13	3335
	α Arietis	W.	26 34 58	3549	27 49 10	3756	29 4 58	3675	30 22 12	3602
	Pollux	E.	54 41 42	3048	53 12 29	3041	51 43 7	3034	50 13 36	3027
	SATURN	E.	65 6 11	2950	63 34 55	2940	62 3 27	2930	60 31 46	2920
	Regulus	E.	90 10 24	2979	88 39 45	2969	87 8 54	2959	85 37 50	2948
24	α Arietis	W.	37 5 47	3332	38 29 21	3291	39 53 43	3263	41 18 50	3217
	Pollux	E.	42 43 56	2994	41 13 36	2989	39 43 9	2984	38 12 36	2979
	SATURN	E.	52 49 58	2984	51 16 53	2952	49 43 32	2930	48 9 55	2927
	Regulus	E.	77 59 4	2992	76 26 35	2980	74 53 51	2967	73 20 50	2955
25	α Arietis	W.	48 34 19	3065	50 3 12	3038	51 32 38	3013	53 2 35	2988
	SATURN	E.	40 17 40	2761	38 42 21	2747	37 6 43	2733	35 30 47	2719
	Regulus	E.	65 31 34	2788	63 56 50	2774	62 21 48	2760	60 46 27	2746
26	α Arietis	W.	60 39 44	2976	62 12 33	2956	63 45 48	2936	65 19 29	2917
	Aldebaran	W.	27 25 38	2975	29 2 51	2960	30 40 24	2946	32 18 17	2931
	Regulus	E.	52 45 3	2975	51 7 49	2960	49 30 15	2946	47 52 22	2932
27	Aldebaran	W.	40 32 37	2960	42 12 27	2948	43 52 36	2933	45 33 4	2920
	Regulus	E.	39 38 9	2951	37 58 21	2948	36 18 14	2935	34 37 49	2922
	Spica	E.	93 30 7	2983	91 51 2	2979	90 11 38	2965	88 31 55	2951
	MARS	E.	94 40 27	2975	93 3 13	2960	91 25 39	2946	89 47 46	2932
28	Aldebaran	W.	53 59 58	2455	55 42 14	2443	57 24 47	2431	59 7 37	2420
	Spica	E.	80 8 49	2480	78 27 20	2477	76 45 35	2467	75 3 35	2456
	MARS	E.	81 33 44	2506	79 54 2	2553	78 14 2	2540	76 33 45	2529
29	Aldebaran	W.	67 45 41	2368	69 30 2	2359	71 14 36	2349	72 59 24	2341
	Pollux	W.	24 50 52	2922	26 29 17	2923	28 8 35	2951	29 48 38	2922
	Spica	E.	66 29 55	2408	64 46 31	2400	63 2 56	2392	61 19 10	2384
	MARS	E.	68 8 24	2475	66 26 35	2465	64 44 33	2456	63 2 18	2447
	JUPITER	E.	106 29 14	2494	104 46 13	2414	103 2 58	2405	101 19 30	2396
30	Aldebaran	W.	81 46 19	2303	83 32 14	2297	85 18 18	2291	87 4 30	2285
	Pollux	W.	38 17 35	2419	40 0 43	2405	41 44 11	2391	43 27 58	2379
	SATURN	W.	27 16 57	2282	29 3 23	2276	30 49 58	2269	32 36 43	2263
	Spica	E.	52 37 57	2357	50 53 20	2353	49 8 38	2351	47 23 53	2349
	MARS	E.	54 28 2	2408	52 44 39	2408	51 1 7	2396	49 17 27	2391
	JUPITER	E.	92 39 7	2357	90 54 30	2350	89 9 44	2344	87 24 49	2339
	Antares	E.	98 31 53	2360	96 47 21	2353	95 2 39	2347	93 17 48	2341
31	Pollux	W.	52 10 42	2335	53 55 51	2328	55 41 9	2322	57 26 36	2317
	SATURN	W.	41 32 24	2241	43 19 50	2237	45 7 22	2234	46 54 59	2231
	Spica	E.	38 39 48	2353	36 55 5	2357	35 10 29	2364	33 26 2	2372
	MARS	E.	40 37 20	2370	38 53 2	2367	37 8 40	2365	35 24 15	2364
	JUPITER	E.	78 38 22	2316	76 52 46	2313	75 7 6	2311	73 21 22	2308
	Antares	E.	84 31 41	2320	82 46 11	2317	81 0 37	2315	79 14 59	2313

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Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	Pollux	E.	60° 37' 17"	3073	59° 8' 35"	3067	57° 39' 45"	3060	56° 10' 47"	3055
	SATURN	E.	71 9 26	2984	69 38 53	2976	68 8 10	2967	66 37 16	2958
23	SUN	W.	120 37 4	3313	122 1 0	3301	123 25 10	3288	124 49 35	3276
	α Pegasi	W.	75 3 44	3319	76 27 34	3303	77 51 42	3288	79 16 8	3279
	α Arietis	W.	31 40 44	3536	33 0 28	3479	34 21 16	3425	35 43 4	3377
	Pollux	E.	48 43 57	3021	47 14 10	3014	45 44 14	3006	44 14 9	3000
	SATURN	E.	58 59 52	2902	57 27 45	2898	55 55 24	2887	54 22 48	2876
	Regulus	E.	84 6 32	2938	82 35 1	2927	81 3 17	2916	79 31 18	2904
24	α Arietis	W.	42 44 39	3183	44 11 8	3151	45 38 16	3121	47 6 0	3092
	Pollux	E.	36 41 57	2976	35 11 14	2973	33 40 28	2973	32 9 40	2973
	SATURN	E.	46 36 2	2814	45 1 52	2801	43 27 25	2788	41 52 41	2775
	Regulus	E.	71 47 33	2942	70 13 59	2926	68 40 8	2915	67 6 0	2901
25	α Arietis	W.	54 33 3	2264	56 4 1	2242	57 35 27	2219	59 7 22	2208
	SATURN	E.	33 54 33	2706	32 18 1	2692	30 41 10	2678	29 4 0	2663
	Regulus	E.	59 10 48	2732	57 34 50	2718	55 58 34	2703	54 21 58	2689
26	α Arietis	W.	66 53 35	2798	68 28 5	2779	70 3 0	2762	71 38 18	2744
	Aldebaran	W.	33 56 30	2616	35 35 3	2602	37 13 55	2588	38 53 6	2574
	Regulus	E.	46 14 10	2618	44 35 39	2603	42 56 48	2589	41 17 38	2575
27	Aldebaran	W.	47 13 50	2506	48 54 55	2493	50 36 18	2480	52 17 59	2467
	Regulus	E.	32 57 6	2509	31 16 5	2496	29 34 46	2484	27 53 10	2472
	Spica	E.	86 51 53	2538	85 11 33	2526	83 30 56	2513	81 50 1	2501
	MARS	E.	88 9 35	2618	86 31 5	2604	84 52 16	2591	83 13 9	2578
28	Aldebaran	W.	60 50 43	2409	62 34 5	2398	64 17 42	2388	66 1 34	2378
	Spica	E.	73 21 20	2445	71 38 50	2436	69 56 6	2425	68 13 7	2416
	MARS	E.	74 53 12	2177	73 12 23	2167	71 31 19	2156	69 49 59	2145
29	Aldebaran	W.	74 44 24	2333	76 29 36	2324	78 15 0	2317	80 0 34	2310
	Pollux	W.	31 29 21	2496	33 10 40	2473	34 52 31	2453	36 34 50	2435
	Spica	E.	59 35 13	2378	57 51 6	2372	56 6 51	2366	54 22 28	2361
	MARS	E.	61 19 50	2438	59 37 10	2430	57 54 18	2422	56 11 15	2415
	JUPITER	E.	99 35 49	2387	97 51 55	2379	96 7 50	2371	94 23 34	2364
30	Aldebaran	W.	88 50 51	2280	90 37 20	2275	92 23 56	2271	94 10 38	2268
	Pollux	W.	45 12 3	2368	46 56 23	2359	48 40 57	2350	50 25 44	2342
	SATURN	W.	34 23 37	2258	36 10 39	2253	37 57 48	2249	39 45 3	2245
	Spica	E.	45 39 5	2348	43 54 15	2347	42 9 24	2348	40 24 35	2350
	MARS	E.	47 33 39	2385	45 49 43	2381	44 5 41	2377	42 21 33	2373
	JUPITER	E.	85 39 46	2234	83 54 36	2228	82 9 18	2224	80 23 53	2220
	Antares	E.	91 32 48	2336	89 47 41	2331	88 2 27	2327	86 17 7	2323
31	Pollux	W.	59 12 10	2313	60 57 50	2309	62 43 36	2306	64 29 27	2303
	SATURN	W.	48 42 40	2220	50 30 24	2228	52 18 10	2227	54 5 58	2225
	Spica	E.	31 41 47	2382	29 57 47	2385	28 14 5	2411	26 30 46	2439
	MARS	E.	33 39 48	2362	31 55 19	2368	30 10 50	2369	28 26 21	2364
	JUPITER	E.	71 35 34	2306	69 49 43	2304	68 3 50	2303	66 17 55	2302
	Antares	E.	77 29 18	2311	75 43 35	2311	73 57 51	2311	72 12 7	2311



## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to Apparent Time.	Diff. for 1 Hour.	
		Apparent Right Ascension.		Diff. for 1 Hour.	Apparent Declination.		Diff. for 1 Hour.				Semi-diameter.
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>		<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>''</sup> <sup>''</sup>					
Wed.	1	20	58	22.73	10.194	S. 17 10' 0.3	+42.51	16' 16.09	68.31	13 47.76	0.337
Thur.	2	21	2	26.98	10.161	16 52 50.8	43.26	16 15.94	68.19	13 55.44	0.304
Frid.	3	21	6	30.42	10.127	16 35 23.6	43.99	16 15.78	68.08	14 2.32	0.270
Sat.	4	21	10	33.07	10.093	16 17 39.1	+44.71	16 15.62	67.96	14 8.39	0.237
SUN.	5	21	14	34.92	10.060	15 59 37.6	45.41	16 15 45	67.84	14 13.67	0.204
Mon.	6	21	18	35.97	10.027	15 41 19.6	46.09	16 15.28	67.72	14 18.15	0.171
Tues.	7	21	22	36.23	9.994	15 22 45 5	+46.75	16 15.10	67.60	14 21.84	0.138
Wed.	8	21	26	35.70	9.962	15 3 55.7	47.40	16 14.92	67.49	14 24.75	0.106
Thur.	9	21	30	34.39	9.929	14 44 50.7	48.03	16 14.74	67.38	14 26.88	0.073
Frid.	10	21	34	32.30	9.897	14 25 30.8	+48.64	16 14.55	67.27	14 28.23	0.041
Sat.	11	21	38	29.43	9.865	14 5 56.4	49.23	16 14.36	67.16	14 28.81	0.009
SUN.	12	21	42	25.79	9.833	13 46 8.1	49.80	16 14.17	67.05	14 28.62	0.023
Mon.	13	21	46	21.39	9.801	13 26 6.3	+50.36	16 13.98	66.94	14 27.66	0.055
Tues.	14	21	50	16.22	9.770	13 5 51.3	50.90	16 13.78	66.83	14 25.94	0.066
Wed.	15	21	54	10.30	9.738	12 45 23.5	51.41	16 13.58	66.72	14 23.48	0.117
Thur.	16	21	58	3.63	9.707	12 24 43.5	+51.91	16 13.38	66.62	14 20.27	0.148
Frid.	17	22	1	56.23	9.676	12 3 51.6	52.39	16 13.18	66.52	14 16.32	0.179
Sat.	18	22	5	48.10	9.646	11 42 48.4	52.86	16 12.98	66.42	14 11.65	0.209
SUN.	19	22	9	39.26	9.617	11 21 34.2	+53.31	16 12.77	66.32	14 6.27	0.238
Mon.	20	22	13	29.72	9.588	11 0 9.4	53.74	16 12.56	66.23	14 0.19	0.267
Tues.	21	22	17	19.50	9.560	10 38 34.5	54.16	16 12.35	66.13	13 53.44	0.295
Wed.	22	22	21	8.61	9.533	10 16 49.8	+54.56	16 12.13	66.04	13 46.02	0.322
Thur.	23	22	24	57.07	9.507	9 54 55.7	54.94	16 11.91	65.95	13 37.95	0.348
Frid.	24	22	28	44.89	9.481	9 32 52.7	55.31	16 11.68	65.86	13 29.25	0.374
Sat.	25	22	32	32.11	9.456	9 10 41.1	+55.66	16 11.45	65.77	13 19.94	0.399
SUN.	26	22	36	18.74	9.431	8 48 21.5	55.99	16 11.22	65.69	13 10.04	0.424
Mon.	27	22	40	4.80	9.408	8 25 54.1	56.30	16 10.98	65.61	12 59.58	0.447
Tues.	28	22	43	50.30	9.386	8 3 19.2	56.60	16 10.74	65.53	12 48.57	0.469
Wed.	29	22	47	35.28	9.365	7 40 37.3	56.89	16 10.50	65.45	12 37.03	0.490
Thur.	30	22	51	19.75	9.344	S. 7 17 48.8	+57.15	16 10.25	65.38	12 24.98	0.511

NOTE.—The mean time of semidiameter passing may be found by subtracting 0<sup>h</sup>.18 from the sidereal time.

The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Subtracted from Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Wed.	1	20 58 20.38	10.193	S. 17 10 10.0	+42.50	13 47.69	0.337	20 44 32.69
Thur.	2	21 2 24.62	10.160	16 53 0.8	43.25	13 55.37	0.304	20 48 29.25
Frid.	3	21 6 28.05	10.126	16 35 33.9	43.98	14 2.25	0.270	20 52 25.80
Sat.	4	21 10 30.69	10.093	16 17 49.6	+44.70	14 8.33	0.237	20 56 22.36
SUN.	5	21 14 32.53	10.070	15 59 48.4	45.40	14 13.62	0.204	21 0 18.91
Mon.	6	21 18 33.58	10.027	15 41 30.6	46.08	14 18.11	0.171	21 4 15.47
Tues.	7	21 22 33.84	9.994	15 22 56.7	+46.74	14 21.81	0.138	21 8 12.02
Wed.	8	21 26 33.31	9.962	15 4 7.1	47.39	14 24.73	0.106	21 12 8.58
Thur.	9	21 30 32.00	9.929	14 45 2.2	48.02	14 26.87	0.073	21 16 5.13
Frid.	10	21 34 29.91	9.897	14 25 42.5	+48.63	14 28.22	0.041	21 20 1.69
Sat.	11	21 38 27.04	9.865	14 6 8.3	49.22	14 28.80	0.009	21 23 58.24
SUN.	12	21 42 23.41	9.833	13 46 20.1	49.79	14 28.62	0.023	21 27 54.79
Mon.	13	21 46 19.02	9.801	13 26 18.4	+50.35	14 27.67	0.055	21 31 51.34
Tues.	14	21 50 13.86	9.770	13 6 3.5	50.89	14 25.96	0.086	21 35 47.90
Wed.	15	21 54 7.95	9.739	12 45 35.8	51.41	14 23.50	0.117	21 39 44.45
Thur.	16	21 58 1.30	9.708	12 24 55.9	+51.91	14 20.30	0.148	21 43 41.01
Frid.	17	22 1 53.92	9.677	12 4 4.1	52.39	14 16.36	0.179	21 47 37.56
Sat.	18	22 5 45.81	9.647	11 43 0.9	52.86	14 11.69	0.209	21 51 34.12
SUN.	19	22 9 36.99	9.618	11 21 46.7	+53.31	14 6.32	0.238	21 55 30.67
Mon.	20	22 13 27.48	9.589	11 0 21.9	53.74	14 0.25	0.267	21 59 27.23
Tues.	21	22 17 17.28	9.561	10 38 47.0	54.16	13 53.50	0.295	22 3 23.78
Wed.	22	22 21 6.42	9.534	10 17 2.3	+54.56	13 46.09	0.322	22 7 20.33
Thur.	23	22 24 54.90	9.508	9 55 8.2	54.95	13 38.02	0.348	22 11 16.88
Frid.	24	22 28 42.76	9.482	9 33 5.1	55.31	13 29.33	0.374	22 15 13.43
Sat.	25	22 32 30.01	9.457	9 10 53.5	+55.66	13 20.03	0.399	22 19 9.98
SUN.	26	22 36 16.67	9.432	8 48 33.8	55.99	13 10.13	0.424	22 23 6.54
Mon.	27	22 40 2.76	9.409	8 26 6.3	56.30	12 59.67	0.447	22 27 3.09
Tues.	28	22 43 48.30	9.387	8 3 31.3	56.60	12 48.66	0.469	22 30 59.64
Wed.	29	22 47 33.31	9.366	7 40 49.3	56.89	12 37.12	0.490	22 34 56.19
Thur.	30	22 51 17.82	9.345	S. 7 18 0.7	+57.16	12 25.07	0.511	22 38 52.75

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing.

Diff. for 1 Hour,  
+ 9".5565.  
(Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	32	312° 7' 31.9	7' 39.9	152.14	+ 0.61	9.9936820	+28.3	<sup>h</sup> 3 <sup>m</sup> 14 <sup>s</sup> 55.28
2	33	313 8 23.0	8 30.8	152.11	0.69	9.9937512	29.3	3 10 59.38
3	34	314 9 13.2	9 20.9	152.07	0.72	9.9938225	30.2	3 7 3.47
4	35	315 10 2.5	10 10.1	152.04	+ 0.73	9.9938959	+31.0	3 3 7.56
5	36	316 10 50.9	10 58.4	152.00	0.71	9.9939712	31.7	2 59 11.65
6	37	317 11 38.4	11 45.7	151.96	0.66	9.9940482	32.4	2 55 15.74
7	38	318 12 24.8	12 32.0	151.92	+ 0.59	9.9941268	+33.1	2 51 19.83
8	39	319 13 10.2	13 17.3	151.87	0.48	9.9942069	33.7	2 47 23.92
9	40	320 13 54.5	14 1.5	151.82	0.36	9.9942684	34.2	2 43 28.01
10	41	321 14 37.6	14 44.5	151.77	+ 0.23	9.9943711	+34.7	2 39 32.11
11	42	322 15 19.4	15 26.2	151.72	+ 0.09	9.9944548	35.2	2 35 36.20
12	43	323 15 59.9	16 6.5	151.66	— 0.05	9.9945396	35.6	2 31 40.29
13	44	324 16 39.0	16 45.5	151.60	— 0.18	9.9946255	+36.1	2 27 44.38
14	45	325 17 16.6	17 23.0	151.53	0.30	9.9947125	36.5	2 23 48.48
15	46	326 17 52.5	17 58.8	151.46	0.40	9.9948005	37.0	2 19 52.57
16	47	327 18 26.6	18 32.8	151.38	— 0.47	9.9948895	+37.4	2 15 56.66
17	48	328 18 59.0	19 5.1	151.31	0.50	9.9949796	37.9	2 12 0.75
18	49	329 19 29.5	19 35.5	151.23	0.51	9.9950709	38.3	2 8 4.84
19	50	330 19 58.2	20 4.1	151.15	— 0.50	9.9951635	+38.9	2 4 8.93
20	51	331 20 25.0	20 30.8	151.07	0.45	9.9952576	39.5	2 0 13.02
21	52	332 20 49.9	20 55.6	150.99	0.37	9.9953531	40.1	1 56 17.11
22	53	333 21 12.8	21 18.4	150.91	— 0.28	9.9954502	+40.8	1 52 21.21
23	54	334 21 33.8	21 39.3	150.83	0.16	9.9955490	41.5	1 48 25.30
24	55	335 21 52.9	21 58.3	150.75	— 0.04	9.9956496	42.3	1 44 29.39
25	56	336 22 10.2	22 15.5	150.68	+ 0.10	9.9957520	+43.0	1 40 33.48
26	57	337 22 25.6	22 30.8	150.60	0.22	9.9958562	43.8	1 36 37.58
27	58	338 22 39.2	22 44.3	150.53	0.33	9.9959622	44.5	1 32 41.67
28	59	339 22 51.1	22 56.1	150.46	0.43	9.9960699	45.2	1 28 45.76
29	60	340 23 1.3	23 6.2	150.39	0.51	9.9961793	45.9	1 24 49.86
30	61	341 23 9.9	23 14.7	150.32	+ 0.55	9.9962904	+46.5	1 20 53.96
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>h</sup> .0.								
Diff. for 1 Hour, — 9 <sup>h</sup> .8296. (Table II.)								

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	16' 13.8	16' 14.4	59' 27.3	+0.25	59' 29.2	+0.08	15 48.0	2.14	19.1
2	16 14.3	16 13.8	59 29.1	-0.06	59 27.3	-0.22	16 39.4	2.15	20.1
3	16 12.9	16 11.5	59 23.8	0.35	59 18.9	0.45	17 31.3	2.18	21.1
4	16 9.9	16 8.0	59 12.9	-0.55	59 5.7	-0.64	18 24.1	2.23	22.1
5	16 5.7	16 3.3	58 57.6	0.71	58 48.7	0.78	19 18.4	2.29	23.1
6	16 0.7	15 57.9	58 39.0	0.83	58 28.7	0.89	20 13.9	2.33	24.1
7	15 54.9	15 51.7	58 17.6	-0.95	58 5.9	-1.00	21 10.0	2.34	25.1
8	15 48.3	15 44.7	57 53.5	1.06	57 40.4	1.12	22 5.8	2.30	26.1
9	15 41.0	15 37.1	57 26.7	1.17	57 12.4	1.21	23 0.0	2.21	27.1
10	15 33.1	15 28.9	56 57.6	-1.25	56 42.4	-1.28	23 51.9	2.11	28.1
11	15 24.7	15 20.4	56 26.8	1.30	56 11.1	1.31	6		29.1
12	15 16.2	15 11.9	55 55.5	1.30	55 40.0	1.27	0 41.2	1.99	0.5
13	15 7.9	15 4.0	55 25.1	-1.22	55 10.8	-1.16	1 27.8	1.89	1.5
14	15 0.3	14 57.0	54 57.4	1.07	54 45.2	0.96	2 12.3	1.81	2.5
15	14 54.1	14 51.6	54 34.4	0.83	54 25.3	0.68	2 55.3	1.77	3.5
16	14 49.6	14 48.2	54 18.0	-0.53	54 12.7	-0.35	3 37.4	1.75	4.5
17	14 47.4	14 47.2	54 9.7	-0.16	54 9.0	+0.05	4 19.4	1.76	5.5
18	14 47.7	14 48.9	54 10.8	+0.26	54 15.2	0.47	5 2.2	1.81	6.5
19	14 50.7	14 53.3	54 22.1	+0.69	54 31.7	+0.91	5 46.4	1.88	7.5
20	14 56.7	15 0.7	54 43.9	1.12	54 58.6	1.33	6 32.6	1.97	8.5
21	15 5.3	15 10.6	55 15.7	1.52	55 35.0	1.69	7 21.1	2.08	9.5
22	15 16.4	15 22.7	55 56.3	+1.85	56 19.4	+1.98	8 12.2	2.18	10.5
23	15 29.3	15 36.2	56 43.8	2.07	57 9.1	2.13	9 5.4	2.25	11.5
24	15 43.2	15 50.3	57 34.9	2.15	58 0.7	2.12	10 0.0	2.29	12.5
25	15 57.1	16 3.6	58 25.8	+2.05	58 49.8	+1.93	10 55.2	2.30	13.5
26	16 9.7	16 15.1	59 12.0	1.76	59 31.9	1.55	11 50.3	2.28	14.5
27	16 19.8	16 23.6	59 49.1	1.30	60 3.1	1.02	12 44.7	2.25	15.5
28	16 26.4	16 28.3	60 13.6	0.73	60 20.5	+0.42	13 38.4	2.22	16.5
29	16 29.2	16 29.1	60 23.7	+0.11	60 23.2	-0.18	14 31.8	2.22	17.5
30	16 28.0	16 26.1	60 19.3	-0.45	60 12.3	-0.70	15 25.3	2.24	18.5

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 1.					FRIDAY 3.				
0	<sup>h</sup> 11 <sup>m</sup> 59 <sup>s</sup> 43.86	2.9466	N. 4 21' 3.7"	12.239	0	<sup>h</sup> 13 <sup>m</sup> 47 <sup>s</sup> 4.97	2.2432	S. 5 32' 31.7"	12.009
1	12 1 58.62	2.9455	4 8 48.6	12.263	1	13 49 19.59	2.2442	5 44 31.2	11.975
2	12 4 13.32	2.2445	3 56 32.1	12.287	2	13 51 34.27	2.2452	5 56 28.7	11.940
3	12 6 27.96	2.2435	3 44 14.1	12.311	3	13 53 49.02	2.2463	6 8 24.0	11.902
4	12 8 42.54	2.2426	3 31 54.8	12.332	4	13 56 3.83	2.2474	6 20 17.0	11.863
5	12 10 57.07	2.2417	3 19 34.3	12.351	5	13 58 18.71	2.2486	6 32 7.6	11.823
6	12 13 11.54	2.2408	3 7 12.7	12.369	6	14 0 33.67	2.2499	6 43 55.8	11.782
7	12 15 25.96	2.2399	2 54 50.0	12.387	7	14 2 48.70	2.2511	6 55 41.5	11.740
8	12 17 40.33	2.2392	2 42 26.2	12.404	8	14 5 3.80	2.2523	7 7 24.6	11.697
9	12 19 54.66	2.2384	2 30 1.5	12.418	9	14 7 18.98	2.2537	7 19 5.1	11.652
10	12 22 8.94	2.2377	2 17 36.0	12.432	10	14 9 34.24	2.2551	7 30 42.9	11.606
11	12 24 23.18	2.2370	2 5 9.7	12.444	11	14 11 49.59	2.2565	7 42 17.8	11.559
12	12 26 37.38	2.2364	1 52 42.7	12.455	12	14 14 5.02	2.2579	7 53 49.9	11.511
13	12 28 51.55	2.2358	1 40 15.1	12.465	13	14 16 20.54	2.2594	8 5 19.1	11.462
14	12 31 5.68	2.2352	1 27 46.9	12.473	14	14 18 36.15	2.2608	8 16 45.3	11.411
15	12 33 19.78	2.2347	1 15 18.3	12.480	15	14 20 51.84	2.2623	8 28 8.4	11.359
16	12 35 33.85	2.2343	1 2 49.3	12.486	16	14 23 7.63	2.2639	8 39 28.4	11.307
17	12 37 47.90	2.2339	0 50 20.0	12.491	17	14 25 23.51	2.2655	8 50 45.2	11.253
18	12 40 1.92	2.2335	0 37 50.4	12.495	18	14 27 39.49	2.2672	9 1 58.8	11.198
19	12 42 15.92	2.2332	0 25 20.6	12.497	19	14 29 55.57	2.2689	9 13 9.0	11.142
20	12 44 29.90	2.2329	0 12 50.8	12.497	20	14 32 11.75	2.2706	9 24 15.8	11.085
21	12 46 43.87	2.2327	N. 0 0 21.0	12.496	21	14 34 28.04	2.2723	9 35 19.2	11.027
22	12 48 57.82	2.2325	S. 0 12 8.7	12.494	22	14 36 44.43	2.2741	9 46 19.0	10.967
23	12 51 11.77	2.2324	S. 0 24 38.3	12.492	23	14 39 0.93	2.2759	S. 9 57 15.2	10.906
THURSDAY 2.					SATURDAY 4.				
0	12 53 25.71	2.2323	S. 0 37 7.7	12.488	0	14 41 17.54	2.2777	S. 10 8 7.7	10.844
1	12 55 39.64	2.2322	0 49 36.8	12.482	1	14 43 34.25	2.2785	10 18 56.5	10.782
2	12 57 53.57	2.2322	1 2 5.5	12.475	2	14 45 51.08	2.2814	10 29 41.5	10.717
3	13 0 7.50	2.2323	1 14 33.8	12.467	3	14 48 8.02	2.2833	10 40 22.6	10.652
4	13 2 21.44	2.2323	1 27 1.5	12.457	4	14 50 25.08	2.2852	10 50 59.7	10.586
5	13 4 35.38	2.2324	1 39 28.6	12.447	5	14 52 42.25	2.2872	11 1 32.9	10.519
6	13 6 49.33	2.2326	1 51 55.1	12.435	6	14 54 59.54	2.2892	11 12 2.0	10.450
7	13 9 3.29	2.2328	2 4 20.8	12.422	7	14 57 16.95	2.2912	11 22 26.9	10.381
8	13 11 17.27	2.2331	2 16 45.7	12.407	8	14 59 34.48	2.2932	11 32 47.7	10.311
9	13 13 31.26	2.2334	2 29 9.7	12.392	9	15 1 52.13	2.2952	11 43 4.2	10.239
10	13 15 45.27	2.2337	2 41 32.7	12.375	10	15 4 9.90	2.2972	11 53 16.4	10.167
11	13 17 59.30	2.2341	2 53 54.7	12.357	11	15 6 27.80	2.2993	12 3 24.2	10.093
12	13 20 13.36	2.2346	3 6 15.6	12.338	12	15 8 45.82	2.3014	12 13 27.5	10.018
13	13 22 27.45	2.2351	3 18 35.3	12.317	13	15 11 3.97	2.3035	12 23 26.3	9.942
14	13 24 41.57	2.2356	3 30 53.7	12.295	14	15 13 22.24	2.3056	12 33 20.5	9.863
15	13 26 55.72	2.2361	3 43 10.7	12.272	15	15 15 40.64	2.3077	12 43 10.1	9.787
16	13 29 9.90	2.2367	3 55 26.3	12.248	16	15 17 59.17	2.3099	12 52 55.0	9.709
17	13 31 24.12	2.2374	4 7 40.5	12.223	17	15 20 17.83	2.3121	13 2 35.2	9.629
18	13 33 38.38	2.2381	4 19 53.1	12.196	18	15 22 36.62	2.3142	13 12 10.5	9.548
19	13 35 52.60	2.2388	4 32 4.0	12.168	19	15 24 55.54	2.3164	13 21 40.9	9.466
20	13 38 7.04	2.2396	4 44 13.2	12.139	20	15 27 14.59	2.3186	13 31 6.4	9.383
21	13 40 21.44	2.2405	4 56 20.7	12.110	21	15 29 33.77	2.3208	13 40 26.9	9.299
22	13 42 35.90	2.2414	5 8 26.4	12.078	22	15 31 53.08	2.3230	13 49 42.3	9.214
23	13 44 50.41	2.2423	5 20 30.1	12.044	23	15 34 12.53	2.3252	13 58 52.6	9.128
24	13 47 4.97	2.2432	S. 5 32 31.7	12.009	24	15 36 32.11	2.3274	S. 14 7 57.7	9.042

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 5.					TUESDAY 7.				
0	<sup>h</sup> 15 <sup>m</sup> 36 <sup>s</sup> 32.11	2.3974	S. 14° 7' 57.7"	9.042	0	<sup>h</sup> 17 <sup>m</sup> 30 <sup>s</sup> 32.56	2.4117	S. 19° 25' 37.6"	3.921
1	15 38 51.82	2.3996	14 16 57.6	8.954	1	17 32 57.29	2.4125	19 29 29.2	3.799
2	15 41 11.66	2.3318	14 25 52.2	8.865	2	17 35 22.06	2.4132	19 33 13.5	3.677
3	15 43 31.63	2.3340	14 34 41.4	8.775	3	17 37 46.87	2.4138	19 36 50.4	3.554
4	15 45 51.74	2.3362	14 43 25.2	8.684	4	17 40 11.72	2.4144	19 40 20.0	3.432
5	15 48 11.98	2.3384	14 52 3.5	8.592	5	17 42 36.60	2.4150	19 43 42.2	3.309
6	15 50 32.35	2.3406	15 0 36.3	8.500	6	17 45 1.52	2.4156	19 46 57.1	3.186
7	15 52 52.85	2.3428	15 9 3.5	8.407	7	17 47 26.47	2.4159	19 50 4.6	3.063
8	15 55 13.48	2.3450	15 17 25.1	8.312	8	17 49 51.43	2.4162	19 53 4.7	2.940
9	15 57 34.25	2.3472	15 25 41.0	8.217	9	17 52 16.41	2.4165	19 55 57.4	2.816
10	15 59 55.15	2.3493	15 33 51.1	8.121	10	17 54 41.41	2.4167	19 58 42.6	2.692
11	16 2 16.17	2.3514	15 41 55.5	8.024	11	17 57 6.42	2.4169	20 1 20.4	2.567
12	16 4 37.32	2.3536	15 49 54.0	7.926	12	17 59 31.44	2.4170	20 3 50.7	2.442
13	16 6 58.60	2.3557	15 57 46.6	7.827	13	18 1 56.46	2.4170	20 6 13.5	2.318
14	16 9 20.01	2.3579	16 5 33.3	7.727	14	18 4 21.48	2.4170	20 8 28.9	2.194
15	16 11 41.55	2.3600	16 13 13.9	7.627	15	18 6 46.50	2.4169	20 10 36.8	2.069
16	16 14 3.21	2.3621	16 20 48.5	7.526	16	18 9 11.51	2.4167	20 12 37.2	1.944
17	16 16 25.00	2.3642	16 28 17.0	7.424	17	18 11 36.50	2.4164	20 14 30.1	1.819
18	16 18 46.91	2.3662	16 35 39.4	7.322	18	18 14 1.47	2.4160	20 16 15.5	1.694
19	16 21 8.94	2.3682	16 42 55.6	7.218	19	18 16 26.42	2.4156	20 17 53.4	1.569
20	16 23 31.09	2.3702	16 50 5.5	7.113	20	18 18 51.35	2.4152	20 19 23.8	1.444
21	16 25 53.37	2.3722	16 57 9.1	7.007	21	18 21 16.25	2.4147	20 20 46.7	1.319
22	16 28 15.76	2.3742	17 4 6.3	6.901	22	18 23 41.11	2.4141	20 22 2.1	1.193
23	16 30 38.27	2.3761	S. 17 10 57.2	6.795	23	18 26 5.94	2.4135	S. 20 23 9.9	1.067
MONDAY 6.					WEDNESDAY 8.				
0	16 33 0.89	2.3779	S. 17 17 41.7	6.687	0	18 28 30.73	2.4127	S. 20 24 10.2	0.942
1	16 35 23.62	2.3798	17 24 19.7	6.579	1	18 30 55.47	2.4118	20 25 3.0	0.817
2	16 37 46.47	2.3817	17 30 51.2	6.470	2	18 33 20.15	2.4109	20 25 48.3	0.693
3	16 40 9.43	2.3835	17 37 16.1	6.360	3	18 35 44.78	2.4100	20 26 26.2	0.569
4	16 42 32.49	2.3852	17 43 34.4	6.249	4	18 38 9.35	2.4089	20 26 56.6	0.444
5	16 44 55.66	2.3870	17 49 46.0	6.138	5	18 40 33.85	2.4078	20 27 19.5	0.319
6	16 47 18.93	2.3887	17 55 51.0	6.026	6	18 42 58.29	2.4067	20 27 34.9	0.195
7	16 49 42.30	2.3903	18 1 49.2	5.914	7	18 45 22.66	2.4055	20 27 42.9	- 0.071
8	16 52 5.77	2.3920	18 7 40.7	5.802	8	18 47 46.95	2.4041	20 27 43.4	+ 0.053
9	16 54 29.34	2.3936	18 13 25.4	5.688	9	18 50 11.15	2.4027	20 27 36.5	0.177
10	16 56 53.00	2.3951	18 19 3.3	5.574	10	18 52 35.27	2.4012	20 27 22.2	0.301
11	16 59 16.75	2.3966	18 24 34.3	5.459	11	18 54 59.30	2.3997	20 27 0.4	0.425
12	17 1 40.59	2.3981	18 29 58.4	5.344	12	18 57 23.23	2.3981	20 26 31.2	0.548
13	17 4 4.52	2.3995	18 35 15.6	5.226	13	18 59 47.07	2.3964	20 25 54.7	0.670
14	17 6 28.53	2.4008	18 40 25.8	5.111	14	19 2 10.80	2.3947	20 25 10.8	0.793
15	17 8 52.62	2.4021	18 45 29.0	4.994	15	19 4 34.43	2.3929	20 24 19.5	0.916
16	17 11 16.79	2.4034	18 50 25.1	4.877	16	19 6 57.95	2.3910	20 23 20.9	1.037
17	17 13 41.03	2.4047	18 55 14.2	4.759	17	19 9 21.35	2.3890	20 22 15.1	1.158
18	17 16 5.35	2.4058	18 59 56.2	4.641	18	19 11 44.63	2.3869	20 21 2.0	1.279
19	17 18 29.73	2.4069	19 4 31.1	4.522	19	19 14 7.78	2.3848	20 19 41.6	1.400
20	17 20 54.18	2.4080	19 8 58.8	4.402	20	19 16 30.81	2.3827	20 18 14.0	1.520
21	17 23 18.69	2.4090	19 13 19.3	4.282	21	19 18 53.71	2.3806	20 16 39.2	1.640
22	17 25 43.26	2.4099	19 17 32.6	4.162	22	19 21 16.48	2.3782	20 14 57.2	1.759
23	17 28 7.88	2.4108	19 21 38.7	4.042	23	19 23 39.10	2.3758	20 13 8.1	1.878
24	17 30 32.56	2.4117	S. 19 25 37.6	3.921	24	19 26 1.58	2.3734	S. 20 11 11.8	1.997

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 9.					SATURDAY 11.				
0	<sup>h</sup> 19 <sup>m</sup> 26 <sup>s</sup> 1.58	2.3734	S. 20° 11' 11.8"	1.997	0	<sup>h</sup> 21 <sup>m</sup> 16 <sup>s</sup> 10.50	2.9013	S. 16° 31' 1.6"	6.877
1	19 28 23.91	2.3709	20 9 8.4	2.115	1	21 18 22.45	2.1971	16 24 6.5	6.958
2	19 30 46.09	2.3684	20 6 58.0	2.233	2	21 20 34.15	2.1938	16 17 6.6	7.038
3	19 33 8.12	2.3658	20 4 40.5	2.350	3	21 22 45.59	2.1885	16 10 2.0	7.117
4	19 35 29.99	2.3632	20 2 16.0	2.466	4	21 24 56.77	2.1842	16 2 52.6	7.196
5	19 37 51.70	2.3605	19 59 44.6	2.582	5	21 27 7.69	2.1799	15 55 38.6	7.272
6	19 40 13.25	2.3577	19 57 6.2	2.697	6	21 29 18.36	2.1757	15 48 20.0	7.348
7	19 42 34.63	2.3548	19 54 20.9	2.812	7	21 31 28.77	2.1713	15 40 56.8	7.422
8	19 44 55.83	2.3519	19 51 28.7	2.927	8	21 33 38.92	2.1670	15 33 29.2	7.497
9	19 47 16.86	2.3490	19 48 29.7	3.040	9	21 35 48.81	2.1627	15 25 57.2	7.570
10	19 49 37.71	2.3459	19 45 23.9	3.153	10	21 37 58.44	2.1584	15 18 20.8	7.643
11	19 51 58.37	2.3428	19 42 11.4	3.265	11	21 40 7.81	2.1541	15 10 40.0	7.715
12	19 54 18.85	2.3397	19 38 52.1	3.377	12	21 42 16.93	2.1498	15 2 55.0	7.786
13	19 56 39.14	2.3366	19 35 26.1	3.488	13	21 44 25.79	2.1455	14 55 5.8	7.854
14	19 58 59.24	2.3333	19 31 53.5	3.598	14	21 46 34.39	2.1413	14 47 12.5	7.922
15	20 1 19.14	2.3301	19 28 14.3	3.708	15	21 48 42.74	2.1370	14 39 15.1	7.990
16	20 3 38.85	2.3267	19 24 28.5	3.817	16	21 50 50.83	2.1327	14 31 13.7	8.057
17	20 5 58.35	2.3233	19 20 36.2	3.925	17	21 52 58.66	2.1284	14 23 8.3	8.122
18	20 8 17.65	2.3200	19 16 37.5	4.033	18	21 55 6.24	2.1242	14 14 59.0	8.187
19	20 10 36.75	2.3165	19 12 32.3	4.140	19	21 57 13.56	2.1199	14 6 45.9	8.250
20	20 12 55.63	2.3129	19 8 20.7	4.246	20	21 59 20.63	2.1157	13 58 29.0	8.313
21	20 15 14.30	2.3093	19 4 2.8	4.351	21	22 1 27.45	2.1116	13 50 8.3	8.376
22	20 17 32.75	2.3058	18 59 38.6	4.455	22	22 3 34.02	2.1074	13 41 43.9	8.437
23	20 19 50.99	2.3022	S. 18 55 8.2	4.559	23	22 5 40.33	2.1031	S. 13 33 15.9	8.496
FRIDAY 10.					SUNDAY 12.				
0	20 22 9.01	2.2985	S. 18 50 31.5	4.663	0	22 7 46.39	2.0969	S. 13 24 44.4	8.554
1	20 24 26.81	2.2947	18 45 48.6	4.765	1	22 9 52.20	2.0948	13 16 9.4	8.612
2	20 26 44.38	2.2910	18 40 59.7	4.866	2	22 11 57.77	2.0907	13 7 30.9	8.669
3	20 29 1.73	2.2872	18 36 4.7	4.967	3	22 14 3.09	2.0866	12 58 49.1	8.725
4	20 31 18.85	2.2833	18 31 3.7	5.067	4	22 16 8.16	2.0825	12 50 3.9	8.781
5	20 33 35.73	2.2794	18 25 56.7	5.165	5	22 18 12.99	2.0784	12 41 15.4	8.835
6	20 35 52.38	2.2756	18 20 43.9	5.263	6	22 20 17.57	2.0743	12 32 23.7	8.888
7	20 38 8.80	2.2717	18 15 25.2	5.360	7	22 22 21.91	2.0703	12 23 28.8	8.941
8	20 40 24.98	2.2677	18 10 0.7	5.457	8	22 24 26.01	2.0663	12 14 30.8	8.992
9	20 42 40.92	2.2637	18 4 30.4	5.552	9	22 26 29.87	2.0623	12 5 29.8	9.042
10	20 44 56.62	2.2597	17 58 54.4	5.647	10	22 28 33.49	2.0584	11 56 25.8	9.091
11	20 47 12.08	2.2557	17 53 12.7	5.741	11	22 30 36.88	2.0545	11 47 18.9	9.140
12	20 49 27.30	2.2516	17 47 25.5	5.834	12	22 32 40.03	2.0506	11 38 9.0	9.188
13	20 51 42.27	2.2475	17 41 32.7	5.926	13	22 34 42.95	2.0467	11 28 56.3	9.235
14	20 53 57.00	2.2434	17 35 34.4	6.017	14	22 36 45.64	2.0428	11 19 40.8	9.281
15	20 56 11.48	2.2392	17 29 30.7	6.107	15	22 38 48.09	2.0389	11 10 22.6	9.325
16	20 58 25.71	2.2351	17 23 21.6	6.196	16	22 40 50.31	2.0352	11 1 1.8	9.368
17	21 0 39.69	2.2310	17 17 7.2	6.284	17	22 42 52.31	2.0315	10 51 38.4	9.411
18	21 2 53.43	2.2268	17 10 47.5	6.371	18	22 44 54.09	2.0277	10 42 12.4	9.454
19	21 5 6.91	2.2226	17 4 22.6	6.457	19	22 46 55.64	2.0240	10 32 43.9	9.496
20	21 7 20.14	2.2183	16 57 52.6	6.543	20	22 48 56.97	2.0203	10 23 12.9	9.536
21	21 9 33.11	2.2141	16 51 17.4	6.629	21	22 50 58.08	2.0167	10 13 39.6	9.575
22	21 11 45.83	2.2098	16 44 37.1	6.713	22	22 52 58.98	2.0131	10 4 3.9	9.614
23	21 13 58.29	2.2056	16 37 51.8	6.796	23	22 54 59.66	2.0095	9 54 25.9	9.652
24	21 16 10.50	2.2013	S. 16 31 1.6	6.877	24	22 57 0.12	2.0059	S. 9 44 45.7	9.689

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 13.					WEDNESDAY 15.				
0	22 57 0.12	2.0059	S. 9 44 45.7	9.689	0	0 29 57.71	1.8841	S. 1 32 43.9	10.592
1	22 59 0.37	2.0025	9 35 3.3	9.725	1	0 31 50.71	1.8897	1 22 12.6	10.592
2	23 1 0.42	1.9991	9 25 18.7	9.760	2	0 33 43.63	1.8813	1 11 41.3	10.581
3	23 3 0.26	1.9956	9 15 32.1	9.794	3	0 35 36.47	1.8800	1 1 10.1	10.519
4	23 4 59.89	1.9922	9 5 43.5	9.827	4	0 37 29.23	1.8788	0 50 39.0	10.517
5	23 6 59.32	1.9888	8 55 52.9	9.860	5	0 39 21.92	1.8776	0 40 8.1	10.514
6	23 8 58.55	1.9855	8 46 0.3	9.892	6	0 41 14.54	1.8764	0 29 37.3	10.511
7	23 10 57.58	1.9822	8 36 5.9	9.922	7	0 43 7.09	1.8752	0 19 6.8	10.507
8	23 12 56.41	1.9789	8 26 9.7	9.952	8	0 44 59.57	1.8740	S. 0 8 36.5	10.502
9	23 14 55.05	1.9757	8 16 11.7	9.982	9	0 46 51.99	1.8732	N. 0 1 53.5	10.497
10	23 16 53.50	1.9726	8 6 11.9	10.011	10	0 48 44.35	1.8722	0 12 23.1	10.490
11	23 18 51.76	1.9694	7 56 10.4	10.038	11	0 50 36.65	1.8712	0 22 52.3	10.483
12	23 20 49.83	1.9663	7 46 7.3	10.064	12	0 52 28.90	1.8704	0 33 21.1	10.476
13	23 22 47.72	1.9633	7 36 2.7	10.090	13	0 54 21.10	1.8696	0 43 49.4	10.469
14	23 24 45.43	1.9603	7 25 56.5	10.116	14	0 56 13.25	1.8688	0 54 17.3	10.461
15	23 26 42.96	1.9573	7 15 48.8	10.140	15	0 58 5.35	1.8680	1 4 44.7	10.459
16	23 28 40.31	1.9543	7 5 39.7	10.163	16	0 59 57.41	1.8673	1 15 11.5	10.449
17	23 30 37.48	1.9514	6 55 29.2	10.186	17	1 1 49.43	1.8667	1 25 37.7	10.432
18	23 32 34.48	1.9486	6 45 17.4	10.207	18	1 3 41.42	1.8662	1 36 3.3	10.421
19	23 34 31.31	1.9458	6 35 4.3	10.228	19	1 5 33.37	1.8656	1 46 28.2	10.409
20	23 36 27.98	1.9431	6 24 50.0	10.249	20	1 7 25.29	1.8652	1 56 52.4	10.397
21	23 38 24.48	1.9403	6 14 34.4	10.269	21	1 9 17.19	1.8647	2 7 15.9	10.385
22	23 40 20.82	1.9377	6 4 17.7	10.288	22	1 11 9.06	1.8643	2 17 38.6	10.372
23	23 42 17.00	1.9350	S. 5 53 59.9	10.306	23	1 13 0.91	1.8640	N. 2 28 0.5	10.358
TUESDAY 14.					THURSDAY 16.				
0	23 44 13.02	1.9324	S. 5 43 41.0	10.323	0	1 14 52.74	1.8637	N. 2 38 21.5	10.343
1	23 46 8.89	1.9299	5 33 21.1	10.339	1	1 16 44.56	1.8635	2 48 41.7	10.328
2	23 48 4.61	1.9274	5 23 0.3	10.355	2	1 18 36.36	1.8633	2 59 0.9	10.313
3	23 50 0.18	1.9249	5 12 38.5	10.371	3	1 20 28.15	1.8632	3 9 19.2	10.297
4	23 51 55.60	1.9225	5 2 15.8	10.385	4	1 22 19.94	1.8632	3 19 36.5	10.280
5	23 53 50.88	1.9202	4 51 52.3	10.398	5	1 24 11.73	1.8631	3 29 52.8	10.263
6	23 55 46.02	1.9178	4 41 28.0	10.411	6	1 26 3.51	1.8631	3 40 8.1	10.246
7	23 57 41.02	1.9156	4 31 2.9	10.423	7	1 27 55.30	1.8632	3 50 22.3	10.227
8	23 59 35.89	1.9134	4 20 37.2	10.434	8	1 29 47.09	1.8633	4 0 35.4	10.208
9	0 1 30.63	1.9112	4 10 10.8	10.445	9	1 31 38.89	1.8634	4 10 47.3	10.188
10	0 3 25.24	1.9091	3 59 43.8	10.455	10	1 33 30.70	1.8636	4 20 58.0	10.168
11	0 5 19.72	1.9069	3 49 16.2	10.465	11	1 35 22.53	1.8639	4 31 7.5	10.148
12	0 7 14.07	1.9048	3 38 48.0	10.473	12	1 37 14.37	1.8643	4 41 15.8	10.127
13	0 9 8.30	1.9029	3 28 19.4	10.481	13	1 39 6.24	1.8647	4 51 22.8	10.105
14	0 11 2.42	1.9010	3 17 50.3	10.488	14	1 40 58.13	1.8650	5 1 28.4	10.082
15	0 12 56.42	1.8991	3 7 20.8	10.495	15	1 42 50.04	1.8654	5 11 32.7	10.060
16	0 14 50.31	1.8972	2 56 50.9	10.501	16	1 44 41.98	1.8660	5 21 35.6	10.037
17	0 16 44.09	1.8954	2 46 20.7	10.506	17	1 46 33.96	1.8666	5 31 37.1	10.013
18	0 18 37.76	1.8936	2 35 50.3	10.509	18	1 48 25.97	1.8672	5 41 37.1	9.988
19	0 20 31.32	1.8919	2 25 19.6	10.513	19	1 50 18.02	1.8678	5 51 35.7	9.963
20	0 22 24.79	1.8903	2 14 48.7	10.516	20	1 52 10.11	1.8685	6 1 32.7	9.937
21	0 24 18.16	1.8887	2 4 17.7	10.518	21	1 54 2.24	1.8692	6 11 28.1	9.910
22	0 26 11.44	1.8872	1 53 46.5	10.521	22	1 55 54.42	1.8701	6 21 21.9	9.884
23	0 28 4.62	1.8856	1 43 15.2	10.522	23	1 57 46.65	1.8710	6 31 14.1	9.857
24	0 29 57.71	1.8841	S. 1 32 43.9	10.522	24	1 59 38.94	1.8719	N. 6 41 4.7	9.829



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 17.					SUNDAY 19.				
0	<sup>h</sup> 1 <sup>m</sup> 59 <sup>s</sup> 38.94	1.8719	N. 6° 41' 4.7"	9.899	0	<sup>h</sup> 3 <sup>m</sup> 31 <sup>s</sup> 25.20	1.9687	N. 13° 50' 8.0"	7.899
1	2 1 31.28	1.8728	6 50 53.6	9.800	1	3 33 23.41	1.9717	13 57 56.1	7.773
2	2 3 23.68	1.8738	7 0 40.7	9.771	2	3 35 21.80	1.9747	14 5 40.8	7.716
3	2 5 16.14	1.8749	7 10 26.1	9.742	3	3 37 20.37	1.9778	14 13 22.0	7.658
4	2 7 8.67	1.8760	7 20 9.7	9.712	4	3 39 19.13	1.9809	14 20 59.8	7.601
5	2 9 1.26	1.8771	7 29 51.5	9.682	5	3 41 18.08	1.9841	14 28 34.1	7.542
6	2 10 53.92	1.8782	7 39 31.5	9.651	6	3 43 17.22	1.9873	14 36 4.8	7.482
7	2 12 46.65	1.8795	7 49 9.6	9.619	7	3 45 16.55	1.9905	14 43 31.9	7.423
8	2 14 39.46	1.8808	7 58 45.7	9.586	8	3 47 16.08	1.9937	14 50 55.5	7.363
9	2 16 32.35	1.8822	8 8 19.9	9.553	9	3 49 15.80	1.9970	14 58 15.5	7.302
10	2 18 25.32	1.8836	8 17 52.1	9.520	10	3 51 15.72	2.0003	15 5 31.8	7.240
11	2 20 18.38	1.8850	8 27 22.3	9.486	11	3 53 15.84	2.0036	15 12 44.3	7.178
12	2 22 11.52	1.8864	8 36 50.4	9.451	12	3 55 16.15	2.0069	15 19 53.1	7.115
13	2 24 4.75	1.8880	8 46 16.4	9.416	13	3 57 16.67	2.0104	15 26 58.1	7.051
14	2 25 58.08	1.8896	8 55 40.3	9.381	14	3 59 17.40	2.0138	15 33 59.2	6.987
15	2 27 51.50	1.8912	9 5 2.1	9.345	15	4 1 18.33	2.0172	15 40 56.5	6.922
16	2 29 45.02	1.8928	9 14 21.7	9.308	16	4 3 19.47	2.0207	15 47 49.9	6.857
17	2 31 38.64	1.8945	9 23 39.0	9.270	17	4 5 20.82	2.0243	15 54 39.3	6.790
18	2 33 32.36	1.8963	9 32 54.1	9.232	18	4 7 22.39	2.0279	16 1 24.7	6.723
19	2 35 26.19	1.8981	9 42 6.9	9.194	19	4 9 24.17	2.0314	16 8 6.1	6.656
20	2 37 20.13	1.8999	9 51 17.4	9.155	20	4 11 26.16	2.0350	16 14 43.4	6.587
21	2 39 14.18	1.9017	10 0 25.5	9.115	21	4 13 28.37	2.0386	16 21 16.6	6.518
22	2 41 8.34	1.9037	10 9 31.2	9.075	22	4 15 30.79	2.0422	16 27 45.6	6.449
23	2 43 2.62	1.9057	N. 10° 18' 34.5"	9.034	23	4 17 33.43	2.0458	N. 16° 34' 10.5"	6.380
SATURDAY 18.					MONDAY 20.				
0	2 44 57.02	1.9077	N. 10° 27' 35.3"	8.993	0	4 19 36.29	2.0495	N. 16° 40' 31.2"	6.309
1	2 46 51.54	1.9098	10 36 33.6	8.951	1	4 21 39.37	2.0532	16 46 47.6	6.237
2	2 48 46.19	1.9119	10 45 29.4	8.909	2	4 23 42.68	2.0570	16 52 59.6	6.164
3	2 50 40.97	1.9141	10 54 22.7	8.867	3	4 25 46.21	2.0607	16 59 7.3	6.091
4	2 52 35.88	1.9162	11 3 13.4	8.823	4	4 27 49.96	2.0644	17 5 10.6	6.018
5	2 54 30.92	1.9184	11 12 1.4	8.778	5	4 29 53.94	2.0682	17 11 9.5	5.944
6	2 56 26.09	1.9207	11 20 46.8	8.734	6	4 31 58.14	2.0719	17 17 3.9	5.869
7	2 58 21.40	1.9231	11 29 29.5	8.688	7	4 34 2.57	2.0757	17 22 53.8	5.793
8	3 0 16.86	1.9255	11 38 9.4	8.642	8	4 36 7.23	2.0796	17 28 39.1	5.717
9	3 2 12.46	1.9278	11 46 46.6	8.596	9	4 38 12.12	2.0834	17 34 19.8	5.640
10	3 4 8.20	1.9302	11 55 21.0	8.549	10	4 40 17.24	2.0872	17 39 55.9	5.562
11	3 6 4.09	1.9327	12 3 52.5	8.502	11	4 42 22.59	2.0911	17 45 27.3	5.484
12	3 8 0.13	1.9353	12 12 21.2	8.454	12	4 44 28.17	2.0950	17 50 54.0	5.406
13	3 9 56.33	1.9379	12 20 47.0	8.405	13	4 46 33.99	2.0989	17 56 16.0	5.326
14	3 11 52.68	1.9404	12 29 9.8	8.355	14	4 48 40.04	2.1028	18 1 33.1	5.245
15	3 13 49.18	1.9430	12 37 29.6	8.305	15	4 50 46.32	2.1067	18 6 45.4	5.164
16	3 15 45.84	1.9457	12 45 46.4	8.254	16	4 52 52.84	2.1106	18 11 52.8	5.082
17	3 17 42.67	1.9485	12 54 0.1	8.203	17	4 54 59.59	2.1144	18 16 55.3	5.000
18	3 19 39.66	1.9513	13 2 10.8	8.151	18	4 57 6.57	2.1183	18 21 52.8	4.917
19	3 21 36.82	1.9541	13 10 18.3	8.099	19	4 59 13.79	2.1223	18 26 45.3	4.833
20	3 23 34.15	1.9569	13 18 22.7	8.047	20	5 1 21.25	2.1262	18 31 32.8	4.749
21	3 25 31.65	1.9598	13 26 23.9	7.993	21	5 3 28.94	2.1302	18 36 15.2	4.663
22	3 27 29.32	1.9627	13 34 21.9	7.939	22	5 5 36.87	2.1341	18 40 52.4	4.577
23	3 29 27.17	1.9657	13 42 16.6	7.884	23	5 7 45.03	2.1380	18 45 24.5	4.491
24	3 31 25.20	1.9687	N. 13° 50' 8.0"	7.829	24	5 9 53.43	2.1420	N. 18° 49' 51.4"	4.404

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 21.					THURSDAY 23.				
0	5 9 53.43	2.1490	N.18° 49' 51".4	4.404	0	6 57 0.44	2.3116	N.20° 28' 26".1	0.522
1	5 12 2.07	2.1459	18 54 13.0	4.316	1	6 59 19.22	2.3143	20 27 51.3	0.638
2	5 14 10.94	2.1498	18 58 29.3	4.228	2	7 1 38.16	2.3170	20 27 9.5	0.755
3	5 16 20.05	2.1538	19 2 40.3	4.139	3	7 3 57.26	2.3197	20 26 20.7	0.872
4	5 18 29.40	2.1577	19 6 46.0	4.049	4	7 6 16.52	2.3223	20 25 24.9	0.988
5	5 20 38.98	2.1617	19 10 46.2	3.958	5	7 8 35.93	2.3248	20 24 22.1	1.105
6	5 22 48.80	2.1656	19 14 40.9	3.866	6	7 10 55.49	2.3273	20 23 12.3	1.222
7	5 24 58.85	2.1695	19 18 30.1	3.774	7	7 13 15.20	2.3297	20 21 55.4	1.340
8	5 27 9.14	2.1734	19 22 13.8	3.682	8	7 15 35.05	2.3320	20 20 31.5	1.458
9	5 29 19.66	2.1773	19 25 51.9	3.588	9	7 17 55.04	2.3343	20 19 0.5	1.576
10	5 31 30.41	2.1812	19 29 24.4	3.494	10	7 20 15.17	2.3366	20 17 22.4	1.694
11	5 33 41.40	2.1851	19 32 51.2	3.400	11	7 22 35.43	2.3389	20 15 37.2	1.813
12	5 35 52.62	2.1889	19 36 12.4	3.305	12	7 24 55.83	2.3411	20 13 44.8	1.932
13	5 38 4.07	2.1927	19 39 27.8	3.209	13	7 27 16.36	2.3433	20 11 45.3	2.052
14	5 40 15.75	2.1966	19 42 37.4	3.112	14	7 29 37.01	2.3455	20 9 38.6	2.172
15	5 42 27.66	2.2004	19 45 41.2	3.015	15	7 31 57.78	2.3477	20 7 24.7	2.291
16	5 44 39.80	2.2043	19 48 39.2	2.917	16	7 34 18.67	2.3491	20 5 3.7	2.410
17	5 46 52.17	2.2081	19 51 31.3	2.818	17	7 36 39.67	2.3510	20 2 35.5	2.530
18	5 49 4.77	2.2118	19 54 17.4	2.719	18	7 39 0.79	2.3529	20 0 0.1	2.650
19	5 51 17.59	2.2156	19 56 57.6	2.620	19	7 41 22.02	2.3547	19 57 17.5	2.770
20	5 53 30.64	2.2193	19 59 31.8	2.519	20	7 43 43.35	2.3564	19 54 27.7	2.891
21	5 55 43.91	2.2230	20 1 59.9	2.418	21	7 46 4.78	2.3580	19 51 30.6	3.012
22	5 57 57.40	2.2267	20 4 21.9	2.316	22	7 48 26.31	2.3597	19 48 26.3	3.132
23	6 0 11.11	2.2303	N.20 6 37.8	2.214	23	7 50 47.94	2.3613	N.19 45 14.8	3.252
WEDNESDAY 22.					FRIDAY 24.				
0	6 2 25.04	2.2340	N.20 8 47.6	2.111	0	7 53 9.66	2.3628	N.19 41 56.0	3.373
1	6 4 39.19	2.2377	20 10 51.2	2.007	1	7 55 31.47	2.3642	19 38 30.0	3.493
2	6 6 53.56	2.2413	20 12 48.5	1.903	2	7 57 53.36	2.3656	19 34 56.8	3.614
3	6 9 8.14	2.2448	20 14 39.6	1.799	3	8 0 15.34	2.3669	19 31 16.3	3.735
4	6 11 22.93	2.2484	20 16 24.4	1.693	4	8 2 37.39	2.3682	19 27 28.6	3.855
5	6 13 37.93	2.2518	20 18 2.8	1.587	5	8 4 59.52	2.3694	19 23 33.7	3.976
6	6 15 53.15	2.2553	20 19 34.8	1.480	6	8 7 21.72	2.3706	19 19 31.5	4.097
7	6 18 8.57	2.2588	20 21 0.4	1.374	7	8 9 43.99	2.3717	19 15 22.1	4.217
8	6 20 24.20	2.2622	20 22 19.6	1.267	8	8 12 6.32	2.3727	19 11 5.5	4.337
9	6 22 40.03	2.2655	20 23 32.4	1.159	9	8 14 28.71	2.3737	19 6 41.7	4.457
10	6 24 56.06	2.2688	20 24 38.7	1.050	10	8 16 51.16	2.3747	19 2 10.6	4.577
11	6 27 12.29	2.2721	20 25 38.4	0.940	11	8 19 13.67	2.3756	18 57 32.4	4.697
12	6 29 28.72	2.2754	20 26 31.5	0.830	12	8 21 36.23	2.3764	18 52 47.0	4.817
13	6 31 45.34	2.2787	20 27 18.0	0.720	13	8 23 58.84	2.3771	18 47 54.4	4.936
14	6 34 2.16	2.2819	20 27 57.9	0.610	14	8 26 21.49	2.3778	18 42 54.7	5.055
15	6 36 19.17	2.2851	20 28 31.2	0.499	15	8 28 44.18	2.3785	18 37 47.8	5.174
16	6 38 36.37	2.2882	20 29 57.8	0.387	16	8 31 6.91	2.3791	18 32 33.8	5.293
17	6 40 53.75	2.2912	20 29 17.6	0.274	17	8 33 29.67	2.3797	18 27 12.7	5.412
18	6 43 11.32	2.2943	20 29 30.7	0.161	18	8 35 52.47	2.3802	18 21 44.4	5.531
19	6 45 29.07	2.2973	20 29 37.0	+ 0.048	19	8 38 15.29	2.3806	18 16 9.0	5.648
20	6 47 47.00	2.3002	20 29 36.5	- 0.065	20	8 40 38.14	2.3810	18 10 26.6	5.765
21	6 50 5.10	2.3032	20 29 29.2	0.179	21	8 43 1.01	2.3813	18 4 37.2	5.883
22	6 52 23.38	2.3061	20 29 15.0	0.293	22	8 45 23.90	2.3817	17 58 40.7	6.000
23	6 54 41.83	2.3089	20 28 54.0	0.407	23	8 47 46.81	2.3819	17 52 37.2	6.116
24	6 57 0.44	2.3116	N.20 28 26.1	0.522	24	8 50 9.73	2.3821	N.17 46 26.8	6.232

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 25.					MONDAY 27.				
0	8 50 9.73	2.3821	N.17° 46' 26.8"	6.329	0	10 43 58.28	2.3494	N.10° 45' 55.1"	10.956
1	8 52 32.66	2.3822	17 40 9.4	6.347	1	10 46 19.21	2.3489	10 34 55.5	11.030
2	8 54 55.60	2.3823	17 33 45.1	6.463	2	10 48 40.06	2.3470	10 23 51.5	11.109
3	8 57 18.54	2.3823	17 27 13.8	6.578	3	10 51 0.85	2.3459	10 12 43.2	11.174
4	8 59 41.48	2.3823	17 20 35.7	6.692	4	10 53 21.57	2.3447	10 1 30.6	11.244
5	9 2 4.42	2.3823	17 13 50.8	6.805	5	10 55 42.22	2.3436	9 50 13.9	11.312
6	9 4 27.36	2.3822	17 6 59.1	6.918	6	10 58 2.80	2.3424	9 38 53.1	11.380
7	9 6 50.29	2.3821	17 0 0.6	7.031	7	11 0 23.31	2.3413	9 27 28.3	11.447
8	9 9 13.21	2.3819	16 52 55.4	7.143	8	11 2 43.75	2.3402	9 15 59.5	11.512
9	9 11 36.12	2.3817	16 45 43.5	7.254	9	11 5 4.13	2.3391	9 4 26.9	11.575
10	9 13 59.01	2.3814	16 38 24.9	7.366	10	11 7 24.44	2.3379	8 52 50.5	11.637
11	9 16 21.89	2.3811	16 30 59.6	7.477	11	11 9 44.68	2.3368	8 41 10.4	11.698
12	9 18 44.75	2.3808	16 23 27.7	7.586	12	11 12 4.85	2.3357	8 29 26.7	11.758
13	9 21 7.59	2.3804	16 15 49.3	7.694	13	11 14 24.96	2.3346	8 17 39.5	11.816
14	9 23 30.40	2.3799	16 8 4.4	7.803	14	11 16 45.00	2.3334	8 5 48.8	11.879
15	9 25 53.18	2.3794	16 0 12.9	7.911	15	11 19 4.97	2.3323	7 53 54.8	11.927
16	9 28 15.93	2.3789	15 52 15.0	8.017	16	11 21 24.88	2.3313	7 41 57.5	11.982
17	9 30 38.65	2.3784	15 44 10.8	8.123	17	11 23 44.73	2.3303	7 29 57.0	12.035
18	9 33 1.34	2.3778	15 36 0.2	8.229	18	11 26 4.52	2.3293	7 17 53.3	12.087
19	9 35 23.99	2.3773	15 27 43.3	8.333	19	11 28 24.25	2.3282	7 5 46.6	12.136
20	9 37 46.60	2.3766	15 19 20.2	8.437	20	11 30 43.91	2.3272	6 53 37.0	12.184
21	9 40 9.18	2.3760	15 10 50.8	8.541	21	11 33 3.51	2.3262	6 41 24.5	12.232
22	9 42 31.72	2.3752	15 2 15.3	8.643	22	11 35 23.05	2.3253	6 29 9.2	12.277
23	9 44 54.21	2.3744	N.14 53 33.7	8.744	23	11 37 42.54	2.3243	N. 6 16 51.2	12.321
SUNDAY 26.					TUESDAY 28.				
0	9 47 16.65	2.3737	N.14 44 46.0	8.845	0	11 40 1.97	2.3233	N. 6 4 30.7	12.363
1	9 49 39.05	2.3729	14 35 52.3	8.944	1	11 42 21.34	2.3224	5 52 7.7	12.404
2	9 52 1.40	2.3721	14 26 52.7	9.043	2	11 44 40.66	2.3216	5 39 42.2	12.445
3	9 54 23.70	2.3712	14 17 47.2	9.141	3	11 46 59.93	2.3207	5 27 14.3	12.483
4	9 56 45.95	2.3703	14 8 35.8	9.238	4	11 49 19.15	2.3198	5 14 44.2	12.520
5	9 59 8.14	2.3694	13 59 18.6	9.334	5	11 51 38.31	2.3189	5 2 11.9	12.555
6	10 1 30.28	2.3685	13 49 55.7	9.429	6	11 53 57.42	2.3182	4 49 37.6	12.588
7	10 3 52.36	2.3676	13 40 27.1	9.523	7	11 56 16.49	2.3174	4 37 1.3	12.621
8	10 6 14.39	2.3667	13 30 52.9	9.616	8	11 58 35.51	2.3166	4 24 23.1	12.652
9	10 8 36.36	2.3657	13 21 13.2	9.707	9	12 0 54.48	2.3158	4 11 43.0	12.682
10	10 10 58.27	2.3647	13 11 28.0	9.798	10	12 3 13.41	2.3151	3 59 1.2	12.710
11	10 13 20.12	2.3637	13 1 37.4	9.888	11	12 5 32.30	2.3144	3 46 17.8	12.737
12	10 15 41.91	2.3626	12 51 41.4	9.977	12	12 7 51.14	2.3137	3 33 32.8	12.762
13	10 18 3.63	2.3615	12 41 40.1	10.065	13	12 10 9.94	2.3131	3 20 46.4	12.785
14	10 20 25.29	2.3605	12 31 33.6	10.152	14	12 12 28.71	2.3126	3 7 58.6	12.807
15	10 22 46.89	2.3594	12 21 21.9	10.237	15	12 14 47.45	2.3120	2 55 9.6	12.827
16	10 25 8.42	2.3583	12 11 5.1	10.322	16	12 17 6.15	2.3114	2 42 19.4	12.846
17	10 27 29.89	2.3572	12 0 43.2	10.406	17	12 19 24.82	2.3109	2 29 28.1	12.864
18	10 29 51.20	2.3561	11 50 16.4	10.488	18	12 21 43.46	2.3104	2 16 35.7	12.881
19	10 32 12.62	2.3550	11 39 44.7	10.569	19	12 24 2.07	2.3099	2 3 42.4	12.896
20	10 34 33.89	2.3539	11 29 8.1	10.649	20	12 26 20.65	2.3095	1 50 48.3	12.907
21	10 36 55.09	2.3527	11 18 26.8	10.727	21	12 28 39.21	2.3091	1 37 53.5	12.918
22	10 39 16.22	2.3516	11 7 40.8	10.805	22	12 30 57.74	2.3087	1 24 58.1	12.928
23	10 41 37.28	2.3505	10 56 50.2	10.881	23	12 33 16.25	2.3083	1 12 2.1	12.937
24	10 43 58.28	2.3494	N.10 45 55.1	10.956	24	12 35 34.74	2.3080	N. 0 59 5.6	12.945

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
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WEDNESDAY 29.

0	h m s	s	N. ° ' "	"
0	12 35 34.74	2.3080	0 59 5.6	12.945
1	12 37 53.21	2.3077	0 46 8.7	12.950
2	12 40 11.67	2.3075	0 33 11.6	12.953
3	12 42 30.11	2.3073	0 20 14.3	12.956
4	12 44 48.54	2.3071	N. 0 7 16.9	12.957
5	12 47 6.96	2.3069	S. 0 5 40.5	12.957
6	12 49 25.37	2.3068	0 18 37.9	12.955
7	12 51 43.77	2.3067	0 31 35.1	12.951
8	12 54 2.17	2.3067	0 44 32.0	12.946
9	12 56 20.57	2.3067	0 57 28.6	12.940
10	12 58 38.97	2.3067	1 10 24.8	12.932
11	13 0 57.37	2.3067	1 23 20.4	12.922
12	13 3 15.77	2.3068	1 36 15.4	12.911
13	13 5 34.18	2.3068	1 49 9.7	12.898
14	13 7 52.59	2.3069	2 2 3.2	12.885
15	13 10 11.01	2.3071	2 14 55.9	12.870
16	13 12 29.44	2.3073	2 27 47.6	12.852
17	13 14 47.89	2.3076	2 40 38.2	12.833
18	13 17 6.35	2.3078	2 53 27.6	12.813
19	13 19 24.83	2.3081	3 6 15.8	12.792
20	13 21 43.33	2.3085	3 19 2.7	12.770
21	13 24 1.85	2.3088	3 31 48.2	12.746
22	13 26 20.39	2.3092	3 44 32.2	12.720
23	13 28 38.96	2.3097	S. 3 57 14.6	12.692

THURSDAY, MARCH 1.

0	13 30 57.55	2.3101	S. 4 9 55.3	12.664
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PHASES OF THE MOON.

		d	h	m
☾	Last Quarter.	Feb.	4	7 25.7
●	New Moon		11	11 52.4
☾	First Quarter		19	13 59.2
○	Full Moon		26	23 57.6

		d	h
☾	Perigee.	Feb.	1 17.2
☾	Apogee.		17 9.5
☾	Perigee.		29 4.3

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Pollux W.	66° 15' 22"	9301	68° 1' 20"	9299	69° 47' 21"	9298	71° 33' 24"	9296
	SATURN W.	55 53 48	9295	57 41 39	9294	59 29 31	9293	61 17 24	9292
	Regulus W.	30 6 19	9251	31 53 31	9250	33 40 44	9249	35 27 58	9249
	JUPITER E.	64 31 59	9302	62 46 2	9302	61 0 5	9302	59 14 8	9302
	Antares E.	70 26 24	9311	68 40 41	9319	66 54 59	9314	65 9 20	9316
	VENUS E.	94 21 12	9630	92 42 58	9630	91 4 44	9629	89 26 29	9629
	SUN E.	133 47 2	9565	132 7 19	9565	130 27 36	9564	128 47 52	9564
2	Pollux W.	80 23 48	9298	82 9 50	9300	83 55 50	9301	85 41 48	9302
	SATURN W.	70 16 36	9229	72 4 21	9230	73 52 4	9229	75 39 44	9225
	Regulus W.	44 24 0	9253	46 11 8	9255	47 58 14	9257	49 45 17	9259
	JUPITER E.	50 24 45	9311	48 39 1	9313	46 53 20	9316	45 7 44	9300
	Antares E.	56 22 5	9335	54 36 56	9340	52 51 55	9346	51 7 3	9363
	VENUS E.	81 15 26	9635	79 37 18	9637	77 59 13	9640	76 21 12	9649
	SUN E.	120 29 23	9569	118 49 46	9572	117 10 12	9574	115 30 41	9576
3	SATURN W.	84 37 8	9248	86 24 24	9251	88 11 35	9255	89 58 41	9258
	Regulus W.	58 39 40	9272	60 26 20	9276	62 12 55	9279	63 59 25	9283
	JUPITER E.	36 21 8	9342	34 36 10	9348	32 51 21	9355	31 6 42	9363
	Antares E.	42 25 36	9401	40 42 3	9414	38 58 48	9429	37 15 54	9445
	VENUS E.	68 11 59	9657	66 34 22	9660	64 56 49	9664	63 19 21	9669
	α Aquilæ E.	90 23 2	9825	88 49 6	9828	87 15 15	9833	85 41 30	9839
	SUN E.	107 13 59	9591	105 34 52	9594	103 55 49	9598	102 16 51	9602
4	SATURN W.	98 52 48	9279	100 39 19	9283	102 25 44	9287	104 12 3	9291
	Regulus W.	72 50 33	9302	74 36 29	9306	76 22 19	9311	78 8 2	9315
	Spica W.	20 10 1	9576	21 49 29	9581	23 29 45	9585	25 10 38	9594
	MARS W.	15 31 44	9450	17 14 8	9443	18 56 42	9438	20 39 22	9436
	VENUS E.	55 13 28	9690	53 36 35	9695	51 59 49	9701	50 23 10	9705
	α Aquilæ E.	77 55 16	9887	76 22 41	9901	74 50 23	9915	73 18 23	9931
	SUN E.	94 3 26	9623	92 25 2	9628	90 46 45	9633	89 8 35	9638
5	Regulus W.	86 54 58	9339	88 40 1	9344	90 24 56	9349	92 9 44	9355
	Spica W.	33 40 26	9443	35 22 59	9440	37 5 37	9438	38 48 18	9436
	MARS W.	29 12 47	9443	30 55 21	9446	32 37 50	9450	34 20 14	9453
	VENUS E.	42 21 37	9732	40 45 40	9738	39 9 51	9744	37 34 9	9750
	α Aquilæ E.	65 44 0	9833	64 14 28	9859	62 45 28	9867	61 17 3	9871
	SUN E.	80 59 24	9663	79 21 55	9669	77 44 33	9674	76 7 18	9680
6	Spica W.	47 21 50	9441	49 4 27	9443	50 47 1	9445	52 20 31	9449
	MARS W.	42 50 53	9475	44 32 42	9479	46 14 25	9484	47 56 1	9489
	VENUS E.	29 37 39	9781	28 2 46	9788	26 28 2	9795	24 53 27	9801
	α Aquilæ E.	54 5 7	9813	52 41 10	9863	51 18 11	9817	49 56 14	9876
	SUN E.	68 2 59	9708	66 26 30	9714	64 50 9	9720	63 13 56	9727
7	Spica W.	61 0 43	9470	62 42 39	9475	64 24 28	9480	66 6 10	9485
	MARS W.	56 22 10	9516	58 3 1	9522	59 43 44	9527	61 24 19	9533
	JUPITER W.	19 43 24	9551	21 23 27	9545	23 3 38	9541	24 43 54	9540
	SUN E.	55 14 59	9759	53 39 37	9766	52 4 24	9772	50 29 20	9779
8	Spica W.	74 32 43	9515	76 13 36	9521	77 54 20	9527	79 34 55	9535
	MARS W.	69 45 5	9565	71 24 48	9572	73 4 21	9579	74 43 45	9585

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	POLLUX W.	73° 19' 29"	2296	75° 5' 34"	2206	76° 51' 39"	2296	78° 37' 44"	2297
	SATURN W.	63° 5' 17"	2224	64° 53' 9"	2225	66° 41' 0"	2226	68° 28' 49"	2227
	REGULUS W.	37° 15' 12"	2250	39° 2' 25"	2250	40° 49' 38"	2251	42° 36' 50"	2252
	JUPITER E.	57° 28' 12"	2303	55° 42' 17"	2304	53° 56' 24"	2306	52° 10' 33"	2308
	ANTARES E.	63° 23' 41"	2319	61° 38' 12"	2322	59° 52' 44"	2325	58° 7' 21"	2330
	VENUS E.	87° 48' 14"	2630	86° 10' 0"	2631	84° 31' 47"	2632	82° 53' 36"	2633
	SUN E.	127° 8' 8"	2565	125° 28' 25"	2566	123° 48' 43"	2568	122° 9' 2"	2568
2	POLLUX W.	87° 27' 44"	2305	89° 13' 36"	2308	90° 59' 24"	2311	92° 45' 8"	2314
	SATURN W.	77° 27' 20"	2237	79° 14' 53"	2239	81° 2' 22"	2242	82° 49' 47"	2245
	REGULUS W.	51° 32' 17"	2261	53° 19' 14"	2264	55° 6' 7"	2266	56° 52' 56"	2270
	JUPITER E.	43° 22' 13"	2323	41° 36' 47"	2327	39° 51' 27"	2332	38° 6' 14"	2337
	ANTARES E.	49° 22' 21"	2361	47° 37' 50"	2369	45° 53' 31"	2379	44° 9' 26"	2389
	VENUS E.	74° 43' 14"	2644	73° 5' 19"	2647	71° 27' 28"	2650	69° 49' 41"	2654
	SUN E.	113° 51' 13"	2579	112° 11' 49"	2581	110° 32' 28"	2584	108° 53' 11"	2588
3	SATURN W.	91° 45' 42"	2262	93° 32' 37"	2266	95° 19' 27"	2270	97° 6' 11"	2274
	REGULUS W.	65° 45' 50"	2287	67° 32' 9"	2290	69° 18' 23"	2294	71° 4' 31"	2298
	JUPITER E.	29° 22' 14"	2371	27° 37' 58"	2380	25° 53' 55"	2391	24° 10' 7"	2403
	ANTARES E.	35° 33' 23"	2464	33° 51' 19"	2485	32° 9' 44"	2508	30° 28' 42"	2536
	VENUS E.	61° 41' 59"	2673	60° 4' 43"	2677	58° 27' 32"	2681	56° 50' 27"	2686
	α Aquilæ E.	84° 7' 53"	2847	82° 34' 26"	2855	81° 1' 10"	2865	79° 28' 6"	2876
	SUN E.	100° 37' 59"	2606	98° 59' 12"	2610	97° 20' 31"	2615	95° 41' 56"	2618
4	SATURN W.	105° 58' 15"	2296	107° 44' 20"	2301	109° 30' 18"	2305	111° 16' 10"	2311
	REGULUS W.	79° 53' 39"	2320	81° 39' 9"	2325	83° 24' 32"	2330	85° 9' 48"	2334
	SPICA W.	26° 52' 0"	2478	28° 33' 44"	2465	30° 15' 46"	2456	31° 58' 1"	2449
	MARS W.	22° 22' 5"	2436	24° 4' 48"	2437	25° 47' 30"	2438	27° 30' 10"	2441
	VENUS E.	48° 46' 37"	2710	47° 10' 11"	2716	45° 33' 52"	2722	43° 57' 41"	2727
	α Aquilæ E.	71° 46' 43"	2948	70° 15' 25"	2966	68° 44' 30"	2987	67° 14' 1"	3009
	SUN E.	87° 30' 31"	2643	85° 52' 34"	2648	84° 14' 44"	2652	82° 37' 0"	2658
5	REGULUS W.	93° 54' 24"	2360	95° 38' 56"	2365	97° 23' 21"	2370	99° 7' 39"	2375
	SPICA W.	40° 31' 1"	2436	42° 13' 45"	2436	43° 56' 28"	2437	45° 39' 10"	2438
	MARS W.	36° 2' 33"	2457	37° 44' 47"	2461	39° 26' 55"	2465	41° 8' 57"	2470
	VENUS E.	35° 58' 35"	2756	34° 23' 9"	2762	32° 47' 51"	2768	31° 12' 41"	2774
	α Aquilæ E.	59° 49' 14"	3149	58° 22' 4"	3185	56° 55' 37"	3225	55° 29' 57"	3267
	SUN E.	74° 30' 11"	2686	72° 53' 12"	2691	71° 16' 20"	2697	69° 39' 36"	2709
6	SPICA W.	54° 11' 56"	2453	55° 51' 16"	2456	57° 36' 31"	2460	59° 18' 40"	2465
	MARS W.	49° 37' 30"	2494	51° 18' 51"	2499	53° 0' 5"	2505	54° 41' 11"	2510
	VENUS E.	23° 19' 1"	2609	21° 44' 45"	2617	20° 10' 39"	2625	18° 36' 43"	2634
	α Aquilæ E.	48° 35' 23"	3542	47° 15' 45"	3613	45° 57' 25"	3692	44° 40' 29"	3778
	SUN E.	61° 37' 52"	2733	60° 1' 56"	2739	58° 26' 8"	2746	56° 50' 29"	2753
7	SPICA W.	67° 47' 45"	2490	69° 29' 12"	2496	71° 10' 31"	2502	72° 51' 41"	2508
	MARS W.	63° 4' 46"	2540	64° 45' 4"	2546	66° 25' 13"	2553	68° 5' 13"	2559
	JUPITER W.	26° 24' 12"	2540	28° 4' 30"	2541	29° 44' 46"	2544	31° 24' 58"	2548
	SUN E.	48° 54' 25"	2786	47° 19' 39"	2794	45° 45' 3"	2801	44° 10' 37"	2808
8	SPICA W.	81° 15' 20"	2541	82° 55' 36"	2548	84° 35' 42"	2556	86° 15' 37"	2564
	MARS W.	76° 23' 0"	2593	78° 2' 5"	2600	79° 41' 0"	2607	81° 19' 45"	2615

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
8	JUPITER	W.	33° 5' 5"	2551	34° 45' 7"	2555	36° 25' 4"	2559	38° 4' 55"	2565
	Antares	W.	29 25 30	2710	31 1 57	2695	32 38 44	2684	34 15 46	2675
	SUN	E.	42 36 20	2816	41 2 13	2834	39 28 16	2831	37 54 29	2839
9	Spica	W.	87 55 22	2572	89 34 56	2580	91 14 19	2588	92 53 31	2596
	MARS	W.	82 58 19	2623	84 36 43	2630	86 14 57	2638	87 53 0	2647
	JUPITER	W.	46 22 10	2596	48 1 10	2603	49 40 1	2610	51 18 42	2618
	Antares	W.	42 22 55	2660	44 0 29	2661	45 38 1	2663	47 15 31	2665
	SUN	E.	30 8 14	2883	28 35 33	2891	27 3 3	2900	25 30 44	2909
13	SUN	W.	17 41 39	3220	19 7 24	3231	20 32 57	3240	21 58 19	3251
	α Arietis	E.	55 35 48	3082	54 7 16	3101	52 39 8	3122	51 11 25	3143
	Aldebaran	E.	86 13 33	2845	84 40 4	2856	83 6 49	2866	81 33 47	2876
14	SUN	W.	29 2 7	3300	30 26 18	3311	31 50 17	3320	33 14 5	3330
	α Arietis	E.	43 59 39	3268	42 34 50	3298	41 10 36	3330	39 46 59	3365
	Aldebaran	E.	73 51 47	2925	72 20 0	2934	70 48 24	2942	69 16 59	2952
15	SUN	W.	40 10 25	3374	41 33 11	3388	42 55 48	3399	44 18 16	3397
	Aldebaran	E.	61 42 41	2993	60 12 20	3001	58 42 9	3009	57 12 7	3015
	Pollux	E.	105 47 3	3042	104 17 42	3048	102 48 29	3055	101 19 24	3061
16	SUN	W.	51 8 35	3431	52 30 17	3436	53 51 53	3440	55 13 24	3446
	Aldebaran	E.	49 43 57	3046	48 14 41	3051	46 45 31	3056	45 16 27	3060
	Pollux	E.	93 55 55	3091	92 27 34	3096	90 59 19	3100	89 31 9	3104
17	SUN	W.	61 59 48	3462	63 20 55	3464	64 41 59	3465	66 3 2	3467
	Aldebaran	E.	37 52 17	3075	36 23 37	3078	34 55 0	3079	33 26 25	3080
	Pollux	E.	82 11 30	3120	80 43 45	3123	79 16 3	3125	77 48 24	3126
	SATURN	E.	91 1 8	3051	89 31 58	3052	88 2 50	3054	86 33 44	3055
18	SUN	W.	72 48 9	3464	74 9 13	3463	75 30 19	3460	76 51 28	3456
	Pollux	E.	70 30 23	3128	69 2 47	3127	67 35 10	3125	66 7 31	3124
	SATURN	E.	79 8 21	3053	77 39 14	3052	76 10 5	3049	74 40 53	3047
19	SUN	W.	83 38 17	3433	84 59 56	3427	86 21 42	3421	87 43 35	3413
	α Arietis	W.	23 17 35	4234	24 25 29	4099	25 35 32	3989	26 47 29	3883
	Pollux	E.	58 48 43	3111	57 20 47	3108	55 52 47	3103	54 24 41	3099
	SATURN	E.	67 13 52	3026	65 44 11	3020	64 14 23	3014	62 44 27	3007
	Regulus	E.	94 21 37	3049	92 52 25	3043	91 23 6	3037	89 53 30	3030
20	SUN	W.	94 35 19	3369	95 58 11	3358	97 21 15	3348	98 44 31	3336
	α Arietis	W.	33 9 8	3535	34 28 54	3484	35 49 36	3438	37 11 9	3396
	Pollux	E.	47 2 53	3076	45 34 14	3071	44 5 29	3066	42 36 38	3062
	SATURN	E.	55 12 35	2967	53 41 41	2958	52 10 36	2948	50 39 18	2938
	Regulus	E.	82 24 8	2990	80 53 43	2981	79 23 6	2970	77 52 15	2959
21	SUN	W.	105 44 21	3272	107 9 5	3259	108 34 5	3244	109 59 22	3230
	α Arietis	W.	44 9 56	3223	45 35 38	3193	47 1 56	3165	48 28 47	3138
	Pollux	E.	35 11 6	3045	33 41 49	3044	32 12 31	3044	30 43 13	3047
	SATURN	E.	42 59 23	2880	41 26 39	2868	39 53 39	2855	38 20 22	2842
	Regulus	E.	70 14 35	2901	68 42 18	2868	67 9 44	2875	65 36 53	2861

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
8	JUPITER W.	39° 44' 38"	2570	41° 24' 14"	2576	43° 3' 42"	2583	44° 43' 1"	2590
	Antares W.	35 53 0	2669	37 30 22	2665	39 7 49	2661	40 45 21	2660
	Sun E.	36 20 52	2646	34 47 26	2656	33 14 11	2665	31 41 7	2673
9	Spica W.	94 32 31	2605	96 11 19	2614	97 49 55	2622	99 28 20	2631
	Mars W.	89 30 51	2655	91 8 32	2663	92 46 2	2679	94 23 20	2681
	JUPITER W.	52 57 13	2626	54 35 33	2633	56 13 43	2641	57 51 42	2649
	Antares W.	48 52 58	2669	50 30 20	2679	52 7 37	2677	53 44 48	2683
	Sun E.	23 58 37	2990	22 26 43	2930	20 55 2	2940	19 23 34	2951
13	Sun W.	23 23 28	3261	24 48 25	3270	26 13 11	3281	27 37 45	3291
	α Arietis E.	49 44 7	3185	48 17 16	3189	46 50 54	3214	45 25 1	3240
	Aldebaran E.	80 0 58	2987	78 28 22	2996	76 55 58	2995	75 23 46	2916
14	Sun W.	34 37 42	3338	36 1 9	3348	37 24 25	3358	38 47 30	3366
	α Arietis E.	38 24 2	3401	37 1 47	3442	35 40 18	3487	34 19 39	3536
	Aldebaran E.	67 45 46	2961	66 14 44	2969	64 43 53	2977	63 13 12	2985
15	Sun W.	45 40 36	3405	47 2 47	3412	48 24 50	3418	49 46 46	3424
	Aldebaran E.	55 42 13	3022	54 12 27	3028	52 42 49	3034	51 13 19	3041
	Pollux E.	99 50 27	3068	98 21 38	3074	96 52 57	3080	95 24 23	3085
16	Sun W.	56 34 49	3450	57 56 9	3454	59 17 25	3456	60 38 38	3459
	Aldebaran E.	43 47 28	3065	42 18 35	3068	40 49 46	3070	39 21 0	3073
	Pollux E.	88 3 4	3108	86 35 4	3112	85 7 9	3115	83 39 18	3118
17	Sun W.	67 24 3	3468	68 45 3	3467	70 6 4	3466	71 27 6	3465
	Aldebaran E.	31 57 51	3081	30 29 18	3081	29 0 45	3081	27 32 12	3080
	Pollux E.	76 20 46	3127	74 53 9	3128	73 25 33	3129	71 57 58	3129
	SATURN E.	85 4 39	3056	83 35 35	3056	82 6 31	3055	80 37 26	3055
18	Sun W.	78 12 41	3453	79 33 58	3449	80 55 19	3445	82 16 45	3439
	Pollux E.	64 39 51	3123	63 12 9	3120	61 44 24	3117	60 16 35	3114
	SATURN E.	73 11 38	3043	71 42 19	3039	70 12 55	3035	68 43 26	3031
19	Sun W.	89 5 37	3405	90 27 48	3397	91 50 8	3388	93 12 38	3379
	α Arietis W.	28 1 6	3795	29 16 13	3718	30 32 41	3649	31 50 22	3589
	Pollux E.	52 56 30	3095	51 28 14	3091	49 59 53	3086	48 31 26	3081
	SATURN E.	61 14 23	3001	59 44 11	2993	58 13 50	2985	56 43 18	2976
	Regulus E.	88 24 4	3023	86 54 20	3015	85 24 26	3007	83 54 22	2999
20	Sun W.	100 8 1	3325	101 31 44	3313	102 55 41	3300	104 19 53	3286
	α Arietis W.	38 33 30	3357	39 56 36	3320	41 20 24	3287	42 44 51	3254
	Pollux E.	41 7 42	3057	39 38 40	3053	38 9 33	3049	36 40 21	3047
	SATURN E.	49 7 47	2927	47 36 3	2916	46 4 4	2905	44 31 51	2893
	Regulus E.	76 21 11	2949	74 49 54	2938	73 18 23	2926	71 46 37	2913
21	Sun W.	111 24 56	3214	112 50 48	3198	114 16 59	3183	115 43 28	3167
	α Arietis W.	49 56 11	3111	51 24 7	3085	52 52 35	3060	54 21 33	3036
	Pollux E.	29 13 58	3059	27 44 50	3060	26 15 52	3073	24 47 9	3090
	SATURN E.	36 46 48	2828	35 12 56	2814	33 38 46	2799	32 4 17	2785
	Regulus E.	64 3 44	2847	62 30 17	2833	60 56 32	2818	59 22 28	2803



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III <sup>b</sup> .	P. L. of Diff.	VI <sup>b</sup> .	P. L. of Diff.	IX <sup>b</sup> .	P. L. of Diff.
22	SUN	W.	117° 10' 17"	3150	118° 37' 26"	3133	120° 4' 55"	3117	121° 32' 44"	3099
	α Arietis	W.	55 51 1	3012	57 20 59	2989	58 51 26	2965	60 22 22	2943
	Aldebaran	W.	22 23 0	2789	23 57 42	2774	25 32 44	2758	27 8 7	2741
	SATURN	E.	30 29 29	2770	28 54 22	2756	27 18 56	2741	25 43 10	2725
	Regulus	E.	57 48 4	2788	56 13 20	2772	54 38 16	2756	53 2 51	2741
	Spica	E.	111 32 0	2825	109 58 4	2808	108 23 46	2792	106 49 7	2775
23	SUN	W.	128 57 14	3010	130 27 14	2992	131 57 37	2973	133 28 23	2956
	α Arietis	W.	68 4 4	2835	69 37 47	2814	71 11 57	2793	72 46 34	2773
	Aldebaran	W.	35 10 31	2657	36 48 11	2640	38 26 12	2623	40 4 36	2605
	Regulus	E.	45 0 23	2658	43 22 46	2641	41 44 47	2624	40 6 25	2607
	Spica	E.	98 50 19	2689	97 13 25	2672	95 36 7	2655	93 58 26	2638
	MARS	E.	106 22 8	2698	104 45 25	2681	103 8 19	2663	101 30 49	2645
24	Aldebaran	W.	48 22 34	2518	50 3 22	2501	51 44 34	2485	53 26 9	2467
	Regulus	E.	31 48 40	2522	30 7 57	2504	28 26 50	2488	26 45 20	2471
	Spica	E.	85 44 9	2551	84 4 6	2534	82 23 40	2517	80 42 50	2500
	MARS	E.	93 17 14	2555	91 37 17	2538	89 56 56	2520	88 16 10	2502
25	Aldebaran	W.	62 0 3	2384	63 44 0	2368	65 28 20	2353	67 13 2	2337
	Spica	E.	72 12 57	2420	70 29 51	2405	68 46 24	2391	67 2 36	2377
	MARS	E.	79 46 15	2417	78 3 4	2401	76 19 30	2384	74 35 33	2369
	JUPITER	E.	115 15 23	2419	113 32 16	2403	111 48 46	2387	110 4 53	2371
26	Aldebaran	W.	76 1 57	2267	77 48 45	2254	79 35 52	2241	81 23 18	2229
	Pollux	W.	32 44 1	2419	34 27 9	2391	36 10 56	2367	37 55 18	2346
	SATURN	W.	23 28 24	2257	25 15 27	2243	27 2 51	2229	28 50 35	2216
	Spica	E.	58 18 42	2313	56 33 1	2302	54 47 4	2291	53 0 52	2282
	MARS	E.	65 50 20	2296	64 4 15	2283	62 17 50	2270	60 31 6	2258
	JUPITER	E.	101 19 58	2299	99 33 57	2285	97 47 36	2273	96 0 57	2261
	Antares	E.	104 11 56	2325	102 26 33	2311	100 40 50	2298	98 54 47	2285
27	Aldebaran	W.	90 24 42	2177	92 13 44	2168	94 3 0	2160	95 52 28	2152
	Pollux	W.	46 44 12	2260	48 31 11	2247	50 18 29	2231	52 6 6	2223
	SATURN	W.	37 53 38	2163	39 43 1	2154	41 32 38	2145	43 22 28	2138
	Spica	E.	44 6 44	2247	42 19 26	2243	40 32 2	2241	38 44 35	2240
	MARS	E.	51 33 9	2204	49 44 47	2195	47 56 12	2186	46 7 24	2179
	JUPITER	E.	87 3 24	2307	85 15 7	2198	83 26 37	2190	81 37 54	2182
	Antares	E.	90 0 15	2331	88 12 34	2223	86 24 40	2215	84 36 35	2208
28	Pollux	W.	61 7 58	2179	62 56 57	2173	64 46 5	2168	66 35 21	2164
	SATURN	W.	52 34 16	2107	54 25 4	2103	56 15 58	2099	58 6 58	2097
	Regulus	W.	24 54 35	2126	26 44 54	2122	28 35 20	2118	30 25 52	2115
	MARS	E.	37 0 50	2151	35 11 8	2147	33 21 20	2144	31 31 28	2142
	JUPITER	E.	72 31 40	2153	70 42 1	2148	68 52 15	2144	67 2 23	2141
	Antares	E.	75 33 43	2181	73 44 47	2178	71 55 46	2175	70 6 41	2174
29	Pollux	W.	75 42 58	2153	77 32 37	2152	79 22 18	2153	81 11 56	2154
	SATURN	W.	67 22 47	2091	69 14 0	2091	71 5 13	2092	72 56 24	2094
	Regulus	W.	39 39 30	2107	41 30 19	2107	43 21 7	2109	45 11 53	2110
	JUPITER	E.	57 52 21	2137	56 2 19	2138	54 12 18	2140	52 22 20	2142
	Antares	E.	61 1 8	2178	59 12 7	2182	57 23 12	2186	55 34 24	2191

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
22	Sun W.	123 0 55	3082	124 29 27	3064	125 58 21	3047	127 27 36	3028
	$\alpha$ Arietis W.	61 53 46	2920	63 25 39	2898	64 58 0	2877	66 30 48	2855
	Aldebaran W.	28 43 52	2725	30 19 59	2708	31 56 28	2691	33 33 20	2675
	SATURN E.	24 7 3	2710	22 30 36	2695	20 53 49	2679	19 16 41	2665
	Regulus E.	51 27 5	2724	49 50 57	2708	48 14 28	2692	46 37 37	2675
	Spica E.	105 14 6	2758	103 38 43	2741	102 2 58	2724	100 26 50	2707
23	Sun W.	134 59 31	2938	136 31 2	2919	138 2 57	2901	139 35 15	2883
	$\alpha$ Arietis W.	74 21 37	2753	75 57 7	2733	77 33 3	2713	79 9 25	2694
	Aldebaran W.	41 43 24	2588	43 22 36	2571	45 2 11	2553	46 42 10	2535
	Regulus E.	38 27 39	2590	36 48 30	2572	35 8 57	2555	33 29 0	2538
	Spica E.	92 20 22	2620	90 41 54	2603	89 3 3	2585	87 23 48	2568
	MARS E.	99 52 55	2627	98 14 37	2609	96 35 54	2591	94 56 46	2573
24	Aldebaran W.	55 8 8	2450	56 50 31	2433	58 33 18	2417	60 16 29	2401
	Regulus E.	25 3 26	2455	23 21 9	2439	21 38 30	2424	19 55 30	2410
	Spica E.	79 1 37	2484	77 20 1	2467	75 38 2	2452	73 55 41	2436
	MARS E.	86 34 59	2485	84 53 24	2467	83 11 25	2450	81 29 2	2433
25	Aldebaran W.	68 58 7	2322	70 43 34	2309	72 29 21	2294	74 15 29	2281
	Spica E.	65 18 28	2363	63 34 0	2349	61 49 12	2337	60 4 6	2324
	MARS E.	72 51 14	2354	71 6 33	2339	69 21 30	2324	67 36 5	2310
	JUPITER E.	108 20 37	2356	106 35 59	2341	104 50 59	2327	103 5 39	2313
26	Aldebaran W.	83 11 2	2218	84 59 3	2206	86 47 21	2196	88 35 54	2186
	Pollux W.	39 40 11	2326	41 25 32	2308	43 11 20	2290	44 57 34	2274
	SATURN W.	30 38 38	2204	32 26 59	2193	34 15 37	2183	36 4 30	2173
	Spica E.	51 14 26	2273	49 27 47	2265	47 40 56	2258	45 53 54	2252
	MARS E.	58 44 4	2245	56 56 44	2235	55 9 8	2224	53 21 16	2214
	JUPITER E.	94 14 0	2249	92 26 45	2238	90 39 14	2227	88 51 27	2216
	Antares E.	97 8 26	2273	95 21 47	2262	93 34 52	2251	91 47 41	2241
27	Aldebaran W.	97 42 8	2145	99 31 59	2138	101 22 0	2132	103 12 10	2127
	Pollux W.	53 51 0	2212	55 42 9	2202	57 30 33	2194	59 19 10	2186
	SATURN W.	45 12 29	2131	47 2 41	2124	48 53 4	2118	50 43 36	2113
	Spica E.	36 57 7	2241	35 9 40	2243	33 22 16	2247	31 34 58	2254
	MARS E.	44 18 25	2172	42 29 15	2165	40 39 55	2159	38 50 26	2155
	JUPITER E.	79 48 59	2174	77 59 53	2168	76 10 37	2162	74 21 12	2157
	Antares E.	82 48 19	2201	80 59 53	2194	79 11 17	2189	77 22 33	2185
28	Pollux W.	68 24 43	2160	70 14 11	2157	72 3 44	2155	73 53 20	2153
	SATURN W.	59 58 2	2094	61 49 10	2092	63 40 21	2091	65 31 34	2091
	Regulus W.	32 16 29	2112	34 7 10	2109	35 57 55	2108	37 48 42	2107
	MARS E.	29 41 33	2141	27 51 37	2141	26 1 41	2142	24 11 46	2144
	JUPITER E.	65 12 27	2139	63 22 28	2138	61 32 27	2137	59 42 24	2137
	Antares E.	68 17 34	2173	66 28 26	2173	64 39 18	2174	62 50 12	2176
29	Pollux W.	83 1 33	2156	84 51 7	2158	86 40 38	2161	88 30 4	2165
	SATURN W.	74 47 32	2096	76 38 37	2099	78 29 37	2103	80 20 32	2107
	Regulus W.	47 2 37	2113	48 53 17	2115	50 43 53	2118	52 34 25	2121
	JUPITER E.	50 32 25	2145	48 42 34	2149	46 52 49	2153	45 3 10	2158
	Antares E.	53 45 43	2197	51 57 11	2204	50 8 50	2214	48 20 43	2223

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>
Thur.	1	22 51 19.75	9.344	S. 7 17 48.8	+57.15	16 10.25	65.38	12 24.98	0.511
Frid.	2	22 55 3.75	9.324	6 54 54.1	57.40	16 10 00	65.31	12 12.45	0.531
Sat.	3	22 58 47.28	9.305	6 31 53.5	57.64	16 9.74	65.24	11 59.46	0.550
SUN.	4	23 2 30.36	9.287	6 8 47.3	+57.86	16 9.49	65.17	11 46.03	0.568
Mon.	5	23 6 13.03	9.270	5 45 36.1	58.07	16 9.23	65.11	11 32.18	0.585
Tues.	6	23 9 55.30	9.253	5 22 20.1	58.26	16 8.97	65.05	11 17.94	0.601
Wed.	7	23 13 37.18	9.237	4 58 59.7	+58.43	16 8.70	65.00	11 3.30	0.617
Thur.	8	23 17 18.70	9.222	4 35 35.4	58.59	16 8.44	64.94	10 48.30	0.632
Frid.	9	23 20 59.87	9.208	4 12 7.6	58.73	16 8.17	64.89	10 32.97	0.646
Sat.	10	23 24 40.71	9.195	3 48 36.5	+58.85	16 7.91	64.84	10 17.31	0.659
SUN.	11	23 28 21.23	9.182	3 25 2.6	58.96	16 7.64	64.80	10 1.31	0.672
Mon.	12	23 32 1.46	9.170	3 1 26.2	59.05	16 7.38	64.75	9 45.02	0.684
Tues.	13	23 35 41.41	9.159	2 37 47.8	+59.13	16 7.11	64.71	9 28.46	0.695
Wed.	14	23 39 21.09	9.148	2 14 7.7	59.19	16 6.85	64.67	9 11.64	0.706
Thur.	15	23 43 0.52	9.139	1 50 26.5	59.24	16 6.58	64.64	8 54.57	0.715
Frid.	16	23 46 39.72	9.130	1 26 44.5	+59.27	16 6.31	64.61	8 37.27	0.724
Sat.	17	23 50 18.71	9.121	1 3 2.0	59.28	16 6.04	64.58	8 19.75	0.733
SUN.	18	23 53 57.51	9.113	0 39 19.3	59.27	16 5.78	64.56	8 2.05	0.741
Mon.	19	23 57 36.13	9.106	S. 0 15 36.9	+59.25	16 5.51	64.54	7 44.17	0.748
Tues.	20	0 1 14.59	9.100	N. 0 8 4.8	59.22	16 5.24	64.52	7 26.12	0.754
Wed.	21	0 4 52.91	9.094	0 31 45.4	59.17	16 4.97	64.50	7 7.94	0.760
Thur.	22	0 8 31.12	9.090	0 55 24.7	+59.11	16 4.70	64.49	6 49.65	0.764
Frid.	23	0 12 9.24	9.087	1 19 2.3	59.03	16 4.43	64.48	6 31.28	0.767
Sat.	24	0 15 47.30	9.085	1 42 37.8	58.93	16 4.16	64.47	6 12.83	0.769
SUN.	25	0 19 25.31	9.083	2 6 10.8	+58.82	16 3.89	64.47	5 54.32	0.771
Mon.	26	0 23 3.29	9.083	2 29 41.0	58.70	16 3.62	64.47	5 35.79	0.771
Tues.	27	0 26 41.27	9.083	2 53 8.1	58.56	16 3.34	64.47	5 17.27	0.771
Wed.	28	0 30 19.27	9.085	3 16 31.8	+58.41	16 3.06	64.47	4 58.78	0.769
Thur.	29	0 33 57.32	9.087	3 39 51.6	58.25	16 2.78	64.48	4 40.34	0.767
Frid.	30	0 37 35.44	9.090	4 3 7.4	58.07	16 2.50	64.49	4 21.96	0.764
Sat.	31	0 41 13.66	9.094	4 26 18.8	57.88	16 2.22	64.51	4 3.67	0.760
SUN.	32	0 44 51.99	9.100	N. 4 49 25.4	+57.67	16 1.94	64.52	3 45.50	0.754

NOTE.—The mean time of semidiameter passing may be found by subtracting 0°.18 from the sidereal time.  
 The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing;  
 north declinations, increasing.

AT GREENWICH MEAN NOON.								
Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Subtracted from Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
Thur.	1	<sup>h</sup> 22 <sup>m</sup> 51 <sup>s</sup> 17.82	<sup>s</sup> 9.345	S. <sup>o</sup> 7 <sup>'</sup> 18 <sup>"</sup> 0.7	+57.16	<sup>m</sup> 12 <sup>s</sup> 25.07	<sup>s</sup> 0.511	<sup>h</sup> 22 <sup>m</sup> 38 <sup>s</sup> 52.75
Frid.	2	22 55 1.85	9.325	6 55 5.8	57.41	12 12.55	0.531	22 42 49.30
Sat.	3	22 58 45.42	9.306	6 32 5.0	57.65	11 59.56	0.550	22 46 45.86
SUN.	4	23 2 28.54	9.288	6 8 58.7	+57.87	11 46.13	0.568	22 50 42.41
Mon.	5	23 6 11.25	9.271	5 45 47.3	58.08	11 32.29	0.585	22 54 38.96
Tues.	6	23 9 53.56	9.255	5 22 31.1	58.27	11 18.05	0.601	22 58 35.51
Wed.	7	23 13 35.48	9.239	4 59 10.5	+58.44	11 3.41	0.617	23 2 32.07
Thur.	8	23 17 17.04	9.224	4 35 46.0	58.60	10 48.42	0.632	23 6 28.62
Frid.	9	23 20 58.25	9.210	4 12 17.9	58.74	10 33.08	0.646	23 10 25.17
Sat.	10	23 24 39.13	9.197	3 48 46.6	+58.86	10 17.41	0.659	23 14 21.72
SUN.	11	23 28 19.69	9.184	3 25 12.4	58.97	10 1.41	0.672	23 18 18.28
Mon.	12	23 31 59.96	9.172	3 1 35.8	59.06	9 45.13	0.684	23 22 14.83
Tues.	13	23 35 39.95	9.161	2 37 57.1	+59.14	9 28.57	0.695	23 26 11.38
Wed.	14	23 39 19.68	9.150	2 14 16.8	59.20	9 11.75	0.706	23 30 7.93
Thur.	15	23 42 59.16	9.141	1 50 35.3	59.25	8 54.68	0.715	23 34 4.48
Frid.	16	23 46 38.41	9.132	1 26 53.0	+59.28	8 37.38	0.724	23 38 1.03
Sat.	17	23 50 17.44	9.123	1 3 10.2	59.29	8 19.85	0.733	23 41 57.59
SUN.	18	23 53 56.28	9.115	0 39 27.2	59.28	8 2.14	0.741	23 45 54.14
Mon.	19	23 57 34.95	9.108	S. 0 15 44.5	+59.26	7 44.26	0.748	23 49 50.69
Tues.	20	0 1 13.46	9.102	N. 0 7 57.5	59.23	7 26.22	0.754	23 53 47.24
Wed.	21	0 4 51.83	9.096	0 31 38.4	59.18	7 8.03	0.760	23 57 43.80
Thur.	22	0 8 30.09	9.092	0 55 18.0	+59.12	6 49.74	0.764	0 1 40.35
Frid.	23	0 12 8.26	9.089	1 18 55.9	59.04	6 31.36	0.767	0 5 36.90
Sat.	24	0 15 46.36	9.087	1 42 31.7	58.94	6 12.91	0.769	0 9 33.45
SUN.	25	0 19 24.41	9.085	2 6 5.0	+58.83	5 54.40	0.771	0 13 30.01
Mon.	26	0 23 2.43	9.085	2 29 35.5	58.71	5 35.87	0.771	0 17 26.56
Tues.	27	0 26 40.46	9.085	2 53 2.9	58.57	5 17.35	0.771	0 21 23.11
Wed.	28	0 30 18.51	9.087	3 16 26.9	+58.42	4 58.85	0.769	0 25 19.66
Thur.	29	0 33 56.61	9.089	3 39 47.1	58.26	4 40.40	0.767	0 29 16.21
Frid.	30	0 37 34.78	9.092	4 3 3.2	58.08	4 22.02	0.764	0 33 12.76
Sat.	31	0 41 13.04	9.096	4 26 14.9	57.89	4 3.72	0.760	0 37 9.32
SUN.	32	0 44 51.42	9.102	N 4 49 21.8	+57.68	3 45.55	0.754	0 41 5.87
NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon. The sign + prefixed to the hourly change of declination indicates that south declinations are decreasing; north declinations, increasing.								Diff. for 1 hour, + 9".8565. (Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	61	341° 23' 9.9	23° 14.7	150.32	+ 0.55	9.9962904	+46.5	<sup>h</sup> 1 <sup>m</sup> 20 <sup>s</sup> 53.96
2	62	342 23 16.8	23 21.5	150.25	0.57	9.9964029	47.1	1 16 58.05
3	63	343 23 22.1	23 26.7	150.18	0.55	9.9965168	47.7	1 13 2.14
4	64	344 23 25.8	23 30.3	150.12	+ 0.51	9.9966320	+48.2	1 9 6.23
5	65	345 23 28.0	23 32.4	150.05	0.43	9.9967483	46.7	1 5 10.33
6	66	346 23 28.5	23 32.8	149.98	0.34	9.9968656	49.0	1 1 14.42
7	67	347 23 27.4	23 31.6	149.91	+ 0.23	9.9969836	+49.3	0 57 18.51
8	68	348 23 24.6	23 28.7	149.85	+ 0.10	9.9971022	49.5	0 53 22.61
9	69	349 23 20.2	23 24.2	149.78	— 0.05	9.9972212	49.6	0 49 26.71
10	70	350 23 14.1	23 18.0	149.71	— 0.18	9.9973404	+49.7	0 45 30.80
11	71	351 23 6.1	23 10.0	149.63	0.31	9.9974598	49.8	0 41 34.89
12	72	352 22 56.2	23 0.0	149.55	0.43	9.9975794	49.9	0 37 38.98
13	73	353 22 44.3	22 48.0	149.47	— 0.53	9.9976991	+49.9	0 33 43.08
14	74	354 22 30.4	22 34.0	149.38	0.60	9.9978188	49.9	0 29 47.17
15	75	355 22 14.5	22 18.0	149.29	0.65	9.9979385	49.9	0 25 51.26
16	76	356 21 56.4	21 59.9	149.19	— 0.66	9.9980583	+49.9	0 21 55.35
17	77	357 21 36.1	21 39.5	149.10	0.65	9.9981782	50.0	0 17 59.45
18	78	358 21 13.5	21 16.8	149.01	0.60	9.9982982	50.1	0 14 3.54
19	79	359 20 48.6	20 51.8	148.92	— 0.52	9.9984183	+50.2	0 10 7.63
20	80	0 20 21.4	20 24.5	148.82	0.42	9.9985387	50.3	0 6 11.73
21	81	1 19 51.8	19 54.9	148.73	0.31	9.9986595	50.5	$\left. \begin{array}{l} 0 \ 2 \ 15.83 \\ 23 \ 58 \ 19.92 \end{array} \right\}$
22	82	2 19 19.9	19 22.9	148.63	— 0.19	9.9987809	+50.7	23 54 24.01
23	83	3 18 45.8	18 48.7	148.54	— 0.06	9.9989029	51.0	23 50 28.11
24	84	4 18 9.5	18 12.3	148.44	+ 0.07	9.9990255	51.2	23 46 32.21
25	85	5 17 30.9	17 33.6	148.35	+ 0.18	9.9991488	+51.5	23 42 36.30
26	86	6 16 50.1	16 52.7	148.25	0.29	9.9992728	51.8	23 38 40.39
27	87	7 16 7.1	16 9.7	148.16	0.36	9.9993975	52.1	23 34 44.48
28	88	8 15 22.1	15 24.6	148.08	+ 0.42	9.9995230	+52.4	23 30 48.58
29	89	9 14 35.1	14 37.5	148.00	0.45	9.9996492	52.7	23 26 52.67
30	90	10 13 46.3	13 48.6	147.92	0.45	9.9997759	52.9	23 22 56.76
31	91	11 12 55.5	12 57.7	147.84	0.41	9.9999031	53.1	23 19 0.86
32	92	12 12 2.8	12 4.9	147.77	+ 0.34	0.0000307	+53.2	23 15 4.96
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>th</sup> .								
								Diff. for 1 Hour, — 9 <sup>s</sup> .8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	16 28.0	16 26.1	60 19.3	-0.45	60 12.3	-0.70	15 25.3	2.24	18.5
2	16 23.4	16 20.1	60 2.4	0.92	59 50.2	1.10	16 19.3	2.27	19.5
3	16 16.2	16 11.9	59 36.0	1.25	59 20.3	1.36	17 14.2	2.31	20.5
4	16 7.4	16 2.6	59 3.5	-1.43	58 46.0	-1.48	18 9.9	2.33	21.5
5	15 57.7	15 52.8	58 28.1	1.50	58 10.0	1.50	19 5.8	2.32	22.5
6	15 47.9	15 43.0	57 52.0	1.49	57 34.2	1.47	20 1.2	2.28	23.5
7	15 38.3	15 33.7	57 16.8	-1.43	56 59.9	-1.39	20 55.1	2.21	24.5
8	15 29.2	15 24.9	56 43.5	1.35	56 27.6	1.30	21 46.9	2.11	25.5
9	15 20.7	15 16.7	56 12.3	1.25	55 57.6	1.20	22 36.2	2.00	26.5
10	15 12.9	15 9.2	55 43.4	-1.15	55 29.9	-1.10	23 23.1	1.91	27.5
11	15 5.7	15 2.4	55 17.0	1.05	55 4.8	0.99	6		28.5
12	14 59.2	14 56.3	54 53.3	0.92	54 42.7	0.85	0 7.9	1.83	29.5
13	14 53.7	14 51.3	54 33.0	-0.77	54 24.3	-0.67	0 51.1	1.78	0.2
14	14 49.3	14 47.6	54 16.9	0.57	54 10.7	0.45	1 33.4	1.75	1.2
15	14 46.4	14 45.5	54 6.0	0.33	54 2.9	-0.18	2 15.5	1.76	2.2
16	14 45.2	14 45.3	54 1.6	-0.03	54 2.2	+0.14	2 57.9	1.79	3.2
17	14 46.1	14 47.4	54 4.9	+0.32	54 9.8	0.50	3 41.4	1.85	4.2
18	14 49.3	14 52.0	54 17.0	0.70	54 26.6	0.90	4 26.4	1.91	5.2
19	14 55.2	14 59.1	54 38.6	+1.10	54 53.0	+1.31	5 13.3	2.00	6.2
20	15 3.7	15 9.0	55 9.9	1.51	55 29.2	1.70	6 2.3	2.09	7.2
21	15 14.9	15 21.3	55 50.7	1.88	56 14.4	2.05	6 53.3	2.16	8.2
22	15 28.2	15 35.6	56 39.8	+2.18	57 6.7	+2.29	7 46.0	2.22	9.2
23	15 43.2	15 51.0	57 34.8	2.37	58 3.5	2.40	8 39.7	2.25	10.2
24	15 58.9	16 6.5	58 32.3	2.38	59 0.5	2.30	9 33.9	2.26	11.2
25	16 13.9	16 20.7	59 27.5	+2.17	59 52.5	+1.98	10 28.2	2.26	12.2
26	16 26.8	16 32.0	60 15.0	1.74	60 34.2	1.44	11 22.4	2.26	13.2
27	16 36.2	16 39.2	60 49.6	1.10	61 0.6	+0.73	12 16.8	2.27	14.2
28	16 41.0	16 41.5	61 7.1	+0.35	61 8.9	-0.05	13 11.6	2.30	15.2
29	16 40.7	16 38.7	61 5.9	-0.43	60 58.5	0.79	14 7.4	2.34	16.2
30	16 35.5	16 31.4	60 47.0	1.12	60 31.7	1.40	15 4.1	2.39	17.2
31	16 26.4	16 20.7	60 13.4	1.63	59 52.6	1.81	16 1.7	2.41	18.2
32	16 14.5	16 8.0	59 29.9	-1.94	59 6.0	-2.02	16 59.5	2.40	19.2

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 1.					SATURDAY 3.				
0	<sup>h</sup> 13 <sup>m</sup> 30 <sup>s</sup> 57.55	2.3101	S. 4° 9' 55.3"	12.664	0	<sup>h</sup> 15 <sup>m</sup> 22 <sup>s</sup> 53.38	2.3619	S. 13° 19' 13.7"	9.743
1	13 33 16.17	2.3106	4 22 34.3	12.634	1	15 25 15.10	2.3626	13 28 55.6	9.653
2	13 35 34.82	2.3112	4 35 11.4	12.602	2	15 27 36.90	2.3640	13 38 32.1	9.562
3	13 37 53.51	2.3117	4 47 46.6	12.570	3	15 29 58.78	2.3654	13 48 3.1	9.471
4	13 40 12.23	2.3123	5 0 19.8	12.536	4	15 32 20.75	2.3668	13 57 28.6	9.379
5	13 42 30.99	2.3129	5 12 50.9	12.500	5	15 34 42.80	2.3682	14 6 48.6	9.286
6	13 44 49.78	2.3135	5 25 19.8	12.463	6	15 37 4.93	2.3696	14 16 2.9	9.191
7	13 47 8.61	2.3142	5 37 46.5	12.425	7	15 39 27.15	2.3710	14 25 11.5	9.096
8	13 49 27.49	2.3150	5 50 10.8	12.385	8	15 41 49.45	2.3723	14 34 14.4	9.000
9	13 51 46.41	2.3157	6 2 32.7	12.344	9	15 44 11.83	2.3737	14 43 11.5	8.902
10	13 54 5.37	2.3164	6 14 52.1	12.302	10	15 46 34.29	2.3750	14 52 2.7	8.804
11	13 56 24.38	2.3172	6 27 8.9	12.257	11	15 48 56.83	2.3763	15 0 48.0	8.706
12	13 58 43.44	2.3181	6 39 22.9	12.211	12	15 51 19.45	2.3777	15 9 27.4	8.607
13	14 1 2.55	2.3189	6 51 34.2	12.165	13	15 53 42.15	2.3790	15 18 0.8	8.506
14	14 3 21.71	2.3198	7 3 42.7	12.117	14	15 56 4.93	2.3802	15 26 28.1	8.403
15	14 5 40.92	2.3207	7 15 48.2	12.067	15	15 58 27.78	2.3815	15 34 49.2	8.301
16	14 8 0.19	2.3217	7 27 50.7	12.017	16	16 0 50.71	2.3828	15 43 4.2	8.198
17	14 10 19.52	2.3226	7 39 50.2	11.965	17	16 3 13.72	2.3841	15 51 13.0	8.094
18	14 12 38.90	2.3235	7 51 46.5	11.912	18	16 5 36.80	2.3853	15 59 15.5	7.989
19	14 14 58.34	2.3246	8 3 39.6	11.857	19	16 7 59.95	2.3865	16 7 11.7	7.884
20	14 17 17.85	2.3257	8 15 29.4	11.801	20	16 10 23.18	2.3877	16 15 1.6	7.778
21	14 19 37.42	2.3267	8 27 15.7	11.744	21	16 12 46.48	2.3889	16 22 45.1	7.671
22	14 21 57.05	2.3277	8 38 58.5	11.684	22	16 15 9.85	2.3900	16 30 22.1	7.562
23	14 24 16.75	2.3288	S. 8 50 37.8	11.626	23	16 17 33.28	2.3911	S. 16 37 52.6	7.455
FRIDAY 2.					SUNDAY 4.				
0	14 26 36.51	2.3299	S. 9 2 13.6	11.565	0	16 19 56.78	2.3922	S. 16 45 16.7	7.347
1	14 28 56.34	2.3311	9 13 45.6	11.509	1	16 22 20.35	2.3933	16 52 34.2	7.236
2	14 31 16.24	2.3322	9 25 13.8	11.438	2	16 24 43.98	2.3943	16 59 45.0	7.125
3	14 33 36.21	2.3334	9 36 38.2	11.373	3	16 27 7.67	2.3953	17 6 49.2	7.014
4	14 35 56.25	2.3346	9 47 58.6	11.307	4	16 29 31.42	2.3963	17 13 46.7	6.902
5	14 38 16.36	2.3358	9 59 15.0	11.240	5	16 31 55.23	2.3973	17 20 37.5	6.791
6	14 40 36.55	2.3371	10 10 27.4	11.172	6	16 34 19.10	2.3982	17 27 21.6	6.678
7	14 42 56.81	2.3383	10 21 35.6	11.102	7	16 36 43.02	2.3991	17 33 58.9	6.564
8	14 45 17.15	2.3396	10 32 39.6	11.031	8	16 39 6.99	2.4000	17 40 29.3	6.449
9	14 47 37.56	2.3408	10 43 39.3	10.959	9	16 41 31.02	2.4009	17 46 52.8	6.334
10	14 49 58.05	2.3421	10 54 34.7	10.886	10	16 43 55.10	2.4017	17 53 9.4	6.219
11	14 52 18.62	2.3434	11 5 25.6	10.811	11	16 46 19.22	2.4024	17 59 19.1	6.103
12	14 54 39.26	2.3447	11 16 12.0	10.736	12	16 48 43.38	2.4031	18 5 21.8	5.987
13	14 56 59.98	2.3461	11 26 53.9	10.659	13	16 51 7.59	2.4038	18 11 17.5	5.870
14	14 59 20.79	2.3475	11 37 31.1	10.581	14	16 53 31.84	2.4044	18 17 6.2	5.753
15	15 1 41.68	2.3488	11 48 3.6	10.502	15	16 55 56.12	2.4050	18 22 47.9	5.636
16	15 4 2.65	2.3502	11 58 31.3	10.422	16	16 58 20.44	2.4056	18 28 22.5	5.517
17	15 6 23.70	2.3515	12 8 54.2	10.341	17	17 0 44.79	2.4062	18 33 49.9	5.397
18	15 8 44.83	2.3529	12 19 12.2	10.259	18	17 3 9.18	2.4068	18 39 10.2	5.278
19	15 11 6.05	2.3543	12 29 25.3	10.176	19	17 5 33.59	2.4070	18 44 23.3	5.159
20	15 13 27.35	2.3557	12 39 33.3	10.091	20	17 7 58.02	2.4074	18 49 29.3	5.040
21	15 15 48.73	2.3571	12 49 36.2	10.005	21	17 10 22.48	2.4078	18 54 28.1	4.919
22	15 18 10.20	2.3585	12 59 33.9	9.918	22	17 12 46.96	2.4081	18 59 19.6	4.798
23	15 20 31.75	2.3598	13 9 26.4	9.832	23	17 15 11.45	2.4083	19 4 3.9	4.677
24	15 22 53.38	2.3612	S. 13 19 13.7	9.743	24	17 17 35.95	2.4085	S. 19 8 40.9	4.556

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 5.					WEDNESDAY 7.				
0	<sup>h</sup> 17 <sup>m</sup> 17 <sup>s</sup> 35.95	2.4085	S. 19° 8' 40.9"	4.556	0	<sup>h</sup> 19 <sup>m</sup> 12 <sup>s</sup> 25.18	2.3540	S. 20° 25' 20.0"	1.332
1	17 20 0.47	2.4087	19 13 10.6	4.434	1	19 14 46.35	2.3515	20 23 56.6	1.448
2	17 22 24.99	2.4088	19 17 33.0	4.312	2	19 17 7.36	2.3489	20 22 26.2	1.565
3	17 24 49.52	2.4088	19 21 48.1	4.191	3	19 19 28.22	2.3463	20 20 48.8	1.682
4	17 27 14.05	2.4088	19 25 55.9	4.068	4	19 21 48.92	2.3437	20 19 4.4	1.798
5	17 29 38.58	2.4088	19 29 56.3	3.945	5	19 24 9.46	2.3410	20 17 13.0	1.914
6	17 32 3.11	2.4087	19 33 49.3	3.822	6	19 26 29.84	2.3382	20 15 14.7	2.029
7	17 34 27.63	2.4086	19 37 34.9	3.698	7	19 28 50.05	2.3354	20 13 9.5	2.143
8	17 36 52.14	2.4084	19 41 13.1	3.576	8	19 31 10.09	2.3327	20 10 57.5	2.257
9	17 39 16.63	2.4081	19 44 44.0	3.452	9	19 33 29.97	2.3298	20 8 38.6	2.372
10	17 41 41.11	2.4077	19 48 7.4	3.328	10	19 35 49.67	2.3268	20 6 12.9	2.484
11	17 44 5.56	2.4073	19 51 23.4	3.204	11	19 38 9.19	2.3238	20 3 40.5	2.597
12	17 46 29.99	2.4069	19 54 31.9	3.080	12	19 40 28.53	2.3207	20 1 1.3	2.709
13	17 48 54.39	2.4065	19 57 33.0	2.957	13	19 42 47.68	2.3177	19 58 15.4	2.820
14	17 51 18.77	2.4061	20 0 26.7	2.832	14	19 45 6.65	2.3147	19 55 22.9	2.930
15	17 53 43.12	2.4055	20 3 12.9	2.708	15	19 47 25.44	2.3116	19 52 23.8	3.040
16	17 56 7.43	2.4048	20 5 51.7	2.584	16	19 49 44.04	2.3084	19 49 18.1	3.150
17	17 58 31.69	2.4040	20 8 23.0	2.459	17	19 52 2.44	2.3051	19 46 5.8	3.259
18	18 0 55.91	2.4033	20 10 46.8	2.335	18	19 54 20.65	2.3018	19 42 47.0	3.367
19	18 3 20.09	2.4026	20 13 3.2	2.211	19	19 56 38.66	2.2985	19 39 21.7	3.476
20	18 5 44.22	2.4017	20 15 12.1	2.086	20	19 58 56.47	2.2952	19 35 49.9	3.582
21	18 8 8.29	2.4007	20 17 13.5	1.962	21	20 1 14.09	2.2919	19 32 11.8	3.687
22	18 10 32.30	2.3997	20 19 7.5	1.837	22	20 3 31.50	2.2885	19 28 27.4	3.792
23	18 12 56.25	2.3987	S. 20 20 54.0	1.712	23	20 5 48.71	2.2851	S. 19 24 36.7	3.897
TUESDAY 6.					THURSDAY 8.				
0	18 15 20.14	2.3976	S. 20 22 33.0	1.588	0	20 8 5.71	2.2816	S. 19 20 39.7	4.002
1	18 17 43.96	2.3964	20 24 4.6	1.465	1	20 10 22.50	2.2781	19 16 36.4	4.106
2	18 20 7.71	2.3952	20 25 28.8	1.341	2	20 12 39.08	2.2746	19 12 27.0	4.208
3	18 22 31.39	2.3940	20 26 45.5	1.217	3	20 14 55.45	2.2710	19 8 11.4	4.311
4	18 24 54.99	2.3926	20 27 54.8	1.093	4	20 17 11.60	2.2673	19 3 49.7	4.412
5	18 27 18.50	2.3912	20 28 56.7	0.969	5	20 19 27.53	2.2637	18 59 22.0	4.512
6	18 29 41.93	2.3897	20 29 51.1	0.845	6	20 21 43.25	2.2602	18 54 48.2	4.613
7	18 32 5.27	2.3882	20 30 38.1	0.722	7	20 23 58.75	2.2565	18 50 8.4	4.712
8	18 34 28.52	2.3867	20 31 17.8	0.600	8	20 26 14.03	2.2528	18 45 22.7	4.810
9	18 36 51.67	2.3850	20 31 50.1	0.477	9	20 28 29.09	2.2491	18 40 31.2	4.907
10	18 39 14.72	2.3833	20 32 15.0	0.354	10	20 30 43.92	2.2453	18 35 33.8	5.004
11	18 41 37.67	2.3816	20 32 32.6	0.232	11	20 32 58.53	2.2416	18 30 30.7	5.100
12	18 44 0.52	2.3799	20 32 42.8	- 0.109	12	20 35 12.91	2.2378	18 25 21.8	5.196
13	18 46 23.26	2.3780	20 32 45.7	+ 0.012	13	20 37 27.06	2.2340	18 20 7.2	5.290
14	18 48 45.88	2.3761	20 32 41.3	0.134	14	20 39 40.99	2.2302	18 14 47.0	5.384
15	18 51 8.39	2.3742	20 32 29.6	0.255	15	20 41 54.69	2.2264	18 9 21.1	5.477
16	18 53 30.78	2.3721	20 32 10.7	0.376	16	20 44 8.16	2.2226	18 3 49.7	5.569
17	18 55 53.04	2.3700	20 31 44.5	0.497	17	20 46 21.40	2.2187	17 58 12.8	5.661
18	18 58 15.18	2.3679	20 31 11.1	0.617	18	20 48 34.40	2.2148	17 52 30.4	5.752
19	19 0 37.19	2.3657	20 30 30.5	0.737	19	20 50 47.17	2.2109	17 46 42.6	5.841
20	19 2 59.07	2.3635	20 29 42.7	0.856	20	20 52 59.71	2.2071	17 40 49.5	5.930
21	19 5 20.81	2.3612	20 28 47.8	0.975	21	20 55 12.02	2.2032	17 34 51.0	6.019
22	19 7 42.41	2.3588	20 27 45.7	1.095	22	20 57 24.09	2.1992	17 28 47.2	6.106
23	19 10 3.87	2.3564	20 26 36.4	1.214	23	20 59 35.92	2.1952	17 22 38.3	6.192
24	19 12 25.18	2.3540	S. 20 25 20.0	1.332	24	21 1 47.52	2.1913	S. 17 16 24.2	6.277



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 9.					SUNDAY 11.				
0	<sup>h</sup> 21 <sup>m</sup> 1 <sup>s</sup> 47.52	2.1913	S. 17° 16' 24.2"	6.977	0	<sup>h</sup> 22 <sup>m</sup> 42 <sup>s</sup> 30.44	2.0103	S. 10° 52' 46.1"	9.373
1	21 3 58.88	2.1873	17 10 5.0	6.362	1	22 44 30.96	2.0071	10 43 22.4	9.417
2	21 6 10.00	2.1834	17 3 40.7	6.447	2	22 46 31.29	2.0039	10 33 56.1	9.470
3	21 8 20.89	2.1795	16 57 11.4	6.530	3	22 48 31.43	2.0007	10 24 27.2	9.502
4	21 10 31.54	2.1755	16 50 37.1	6.612	4	22 50 31.37	1.9974	10 14 55.9	9.542
5	21 12 41.95	2.1716	16 43 58.0	6.693	5	22 52 31.12	1.9942	10 5 22.2	9.582
6	21 14 52.13	2.1677	16 37 14.0	6.773	6	22 54 30.68	1.9911	9 55 46.1	9.621
7	21 17 2.07	2.1637	16 30 25.2	6.853	7	22 56 30.05	1.9880	9 46 7.7	9.659
8	21 19 11.77	2.1597	16 23 31.6	6.933	8	22 58 29.24	1.9850	9 36 27.0	9.697
9	21 21 21.23	2.1557	16 16 33.3	7.011	9	23 0 28.25	1.9819	9 26 44.1	9.734
10	21 23 30.45	2.1517	16 9 30.3	7.087	10	23 2 27.07	1.9789	9 16 59.0	9.770
11	21 25 30.43	2.1477	16 2 22.8	7.163	11	23 4 25.72	1.9760	9 7 11.7	9.805
12	21 27 48.18	2.1438	15 55 10.7	7.239	12	23 6 24.19	1.9730	8 57 22.4	9.839
13	21 29 56.69	2.1398	15 47 54.1	7.313	13	23 8 22.48	1.9701	8 47 31.1	9.872
14	21 32 4.96	2.1359	15 40 33.1	7.387	14	23 10 20.60	1.9672	8 37 37.8	9.905
15	21 34 13.00	2.1320	15 33 7.6	7.461	15	23 12 18.55	1.9644	8 27 42.5	9.937
16	21 36 20.80	2.1280	15 25 37.8	7.532	16	23 14 16.33	1.9616	8 17 45.3	9.968
17	21 38 28.36	2.1241	15 18 3.8	7.603	17	23 16 13.94	1.9588	8 7 46.3	9.998
18	21 40 35.69	2.1202	15 10 25.5	7.673	18	23 18 11.39	1.9561	7 57 45.6	10.027
19	21 42 42.78	2.1163	15 2 43.0	7.742	19	23 20 8.67	1.9534	7 47 43.1	10.056
20	21 44 49.61	2.1124	14 54 56.4	7.811	20	23 22 5.79	1.9507	7 37 38.9	10.084
21	21 46 56.27	2.1085	14 47 5.7	7.878	21	23 24 2.76	1.9481	7 27 33.0	10.112
22	21 49 2.66	2.1046	14 39 11.0	7.945	22	23 25 59.57	1.9456	7 17 25.5	10.138
23	21 51 8.82	2.1007	S. 14° 31' 12.3"	8.012	23	23 27 56.23	1.9430	S. 7° 7' 16.5"	10.163
SATURDAY 10.					MONDAY 12.				
0	21 53 14.75	2.0969	S. 14° 23' 9.6"	8.077	0	23 29 52.73	1.9404	S. 6° 57' 6.0"	10.187
1	21 55 20.45	2.0931	14 15 3.1	8.140	1	23 31 49.08	1.9380	6 46 54.1	10.211
2	21 57 25.92	2.0892	14 6 52.8	8.203	2	23 33 45.29	1.9356	6 36 40.7	10.235
3	21 59 31.16	2.0854	13 58 38.7	8.266	3	23 35 41.36	1.9332	6 26 25.9	10.257
4	22 1 36.17	2.0816	13 50 20.9	8.327	4	23 37 37.28	1.9309	6 16 9.8	10.278
5	22 3 40.95	2.0778	13 41 59.5	8.388	5	23 39 33.06	1.9286	6 5 52.5	10.298
6	22 5 45.51	2.0741	13 33 34.4	8.448	6	23 41 28.71	1.9263	5 55 34.0	10.318
7	22 7 49.84	2.0704	13 25 5.7	8.506	7	23 43 24.22	1.9241	5 45 14.3	10.337
8	22 9 53.95	2.0667	13 16 33.6	8.563	8	23 45 19.60	1.9218	5 34 53.5	10.356
9	22 11 57.84	2.0630	13 7 58.1	8.620	9	23 47 14.84	1.9197	5 24 31.6	10.371
10	22 14 1.51	2.0593	12 59 19.2	8.677	10	23 49 9.96	1.9176	5 14 8.6	10.389
11	22 16 4.96	2.0557	12 50 36.9	8.733	11	23 51 4.95	1.9155	5 3 44.6	10.408
12	22 18 8.19	2.0520	12 41 51.3	8.788	12	23 52 59.82	1.9135	4 53 19.6	10.424
13	22 20 11.20	2.0484	12 33 2.4	8.841	13	23 54 54.57	1.9115	4 42 53.7	10.438
14	22 22 14.00	2.0448	12 24 10.4	8.893	14	23 56 49.20	1.9096	4 32 27.0	10.452
15	22 24 16.58	2.0412	12 15 15.3	8.944	15	23 58 43.72	1.9077	4 21 59.5	10.465
16	22 26 18.95	2.0377	12 6 17.1	8.996	16	0 2 38.12	1.9058	4 11 31.2	10.478
17	22 28 21.11	2.0342	11 57 15.8	9.047	17	0 2 32.41	1.9039	4 1 2.2	10.490
18	22 30 23.06	2.0307	11 48 11.5	9.096	18	0 4 26.59	1.9022	3 50 32.4	10.502
19	22 32 24.80	2.0272	11 39 4.3	9.144	19	0 6 20.67	1.9005	3 40 2.0	10.512
20	22 34 26.33	2.0238	11 29 54.2	9.192	20	0 8 14.64	1.8987	3 29 31.0	10.521
21	22 36 27.66	2.0205	11 20 41.3	9.238	21	0 10 8.51	1.8970	3 18 59.5	10.529
22	22 38 28.79	2.0171	11 11 25.6	9.284	22	0 12 2.28	1.8954	3 8 27.5	10.538
23	22 40 29.72	2.0137	11 2 7.2	9.329	23	0 13 55.96	1.8938	2 57 55.0	10.546
24	22 42 30.44	2.0103	S. 10° 52' 46.1"	9.373	24	0 15 49.54	1.8922	S. 2° 47' 22.0"	10.553

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 13.					THURSDAY 15.				
0	h m s	"	S. 2 47' 22.0"	10.553	0	h m s	"	N. 5 34' 9.4"	10.096
1	0 15 49.54	1.8922	2 36 48.6	10.559	1	1 45 42.03	1.8690	5 44 14.4	10.071
2	0 17 43.03	1.8907	2 26 14.9	10.564	2	1 47 34.19	1.8696	5 54 17.9	10.046
3	0 19 36.43	1.8893	2 15 41.0	10.568	3	1 49 26.38	1.8701	6 4 19.9	10.020
4	0 21 29.75	1.8879	2 5 6.8	10.572	4	1 51 18.60	1.8707	6 14 20.3	9.993
5	0 23 22.98	1.8866	1 54 32.3	10.576	5	1 53 10.86	1.8714	6 24 19.0	9.965
6	0 25 16.14	1.8853	1 43 57.6	10.579	6	1 55 3.17	1.8722	6 34 16.1	9.937
7	0 27 9.22	1.8840	1 33 22.8	10.581	7	1 56 55.52	1.8729	6 44 11.5	9.909
8	0 29 2.22	1.8828	1 22 47.9	10.582	8	1 58 47.92	1.8737	6 54 5.2	9.880
9	0 30 55.15	1.8816	1 12 13.0	10.582	9	2 0 40.37	1.8746	7 3 57.1	9.850
10	0 32 48.01	1.8804	1 1 38.1	10.582	10	2 2 32.87	1.8755	7 13 47.2	9.819
11	0 34 40.80	1.8793	0 51 3.2	10.582	11	2 4 35.43	1.8764	7 23 35.4	9.788
12	0 36 33.52	1.8782	0 40 28.3	10.580	12	2 6 18.04	1.8773	7 33 21.8	9.757
13	0 38 26.18	1.8772	0 29 53.6	10.577	13	2 8 10.71	1.8784	7 43 6.3	9.725
14	0 40 18.78	1.8762	0 19 19.0	10.575	14	2 10 3.45	1.8795	7 52 48.8	9.693
15	0 42 11.33	1.8753	S. 0 8 44.6	10.572	15	2 11 56.25	1.8805	8 2 29.4	9.660
16	0 44 3.82	1.8743	N. 0 1 49.6	10.568	16	2 13 49.11	1.8816	8 12 8.0	9.626
17	0 45 56.25	1.8735	0 12 23.5	10.563	17	2 15 42.04	1.8828	8 21 44.5	9.591
18	0 47 48.64	1.8727	0 22 57.1	10.558	18	2 17 35.05	1.8841	8 31 18.9	9.556
19	0 49 40.98	1.8720	0 33 30.4	10.552	19	2 19 28.13	1.8853	8 40 51.2	9.520
20	0 51 33.28	1.8712	0 44 3.3	10.544	20	2 21 21.29	1.8866	8 50 21.3	9.484
21	0 53 25.53	1.8705	0 54 35.7	10.536	21	2 23 14.53	1.8879	9 9 14.9	9.447
22	0 55 17.74	1.8699	1 5 7.6	10.528	22	2 25 7.84	1.8893	9 18 38.4	9.410
23	0 57 9.92	1.8693	N. 1 15 39.0	10.519	23	2 27 1.24	1.8907		9.372
24	0 59 2.06	1.8687				2 28 54.72	1.8921		
WEDNESDAY 14.					FRIDAY 16.				
0	h m s	"	N. 1 26 9.9	10.510	0	2 30 48.29	1.8936	N. 9 27 59.6	9.334
1	1 0 54.17	1.8682	1 36 40.2	10.500	1	2 32 41.95	1.8952	9 37 18.5	9.295
2	1 2 46.25	1.8678	1 47 9.9	10.489	2	2 34 35.71	1.8967	9 46 35.0	9.255
3	1 4 38.31	1.8674	1 57 38.9	10.478	3	2 36 29.56	1.8983	9 55 49.1	9.214
4	1 6 30.34	1.8670	2 8 7.2	10.466	4	2 38 23.51	1.8999	10 5 0.7	9.173
5	1 8 22.35	1.8667	2 18 34.8	10.454	5	2 40 17.55	1.9015	10 14 9.8	9.131
6	1 10 14.34	1.8663	2 29 1.7	10.441	6	2 42 11.69	1.9033	10 23 16.1	9.089
7	1 12 6.31	1.8661	2 39 27.8	10.427	7	2 44 5.94	1.9051	10 32 20.5	9.047
8	1 13 58.27	1.8659	2 49 53.0	10.412	8	2 46 0.30	1.9068	10 41 22.0	9.004
9	1 15 50.22	1.8658	3 0 17.2	10.396	9	2 47 54.76	1.9086	10 50 21.0	8.961
10	1 17 42.17	1.8657	3 10 40.5	10.381	10	2 49 49.33	1.9105	10 59 17.3	8.916
11	1 19 34.11	1.8656	3 21 2.9	10.365	11	2 51 44.02	1.9125	11 8 10.9	8.871
12	1 21 26.04	1.8655	3 31 24.3	10.348	12	2 53 38.83	1.9144	11 17 1.8	8.825
13	1 23 17.97	1.8656	3 41 44.6	10.330	13	2 55 33.75	1.9163	11 25 49.9	8.779
14	1 25 9.91	1.8657	3 52 3.9	10.312	14	2 57 28.79	1.9182	11 34 35.2	8.733
15	1 27 1.85	1.8657	4 2 22.1	10.293	15	2 59 23.94	1.9202	11 43 17.8	8.686
16	1 28 53.79	1.8658	4 12 39.1	10.273	16	3 1 19.22	1.9224	11 51 57.5	8.637
17	1 30 45.74	1.8660	4 22 54.9	10.253	17	3 3 14.63	1.9245	12 0 34.3	8.588
18	1 32 37.71	1.8662	4 33 9.5	10.233	18	3 5 10.16	1.9266	12 9 8.1	8.539
19	1 34 29.69	1.8665	4 43 22.9	10.213	19	3 7 5.82	1.9288	12 17 39.0	8.490
20	1 36 21.69	1.8668	4 53 35.0	10.190	20	3 9 1.61	1.9310	12 26 6.9	8.440
21	1 38 13.71	1.8672	5 3 45.7	10.167	21	3 10 57.54	1.9332	12 34 31.8	8.389
22	1 40 5.75	1.8676	5 13 55.0	10.143	22	3 12 53.60	1.9355	12 42 53.6	8.337
23	1 41 57.82	1.8690	5 24 2.9	10.120	23	3 14 49.80	1.9377	12 51 12.3	8.285
24	1 43 49.91	1.8694	N. 5 34 9.4	10.096	24	3 16 46.13	1.9400	N. 12 59 27.8	8.232

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 17.					MONDAY 19.				
0	3 16 46.13	1.9400	N. 12 59 27.8	8.232	0	4 53 5.02	2.0810	N. 18 22 46.6	5.009
1	3 18 42.60	1.9424	13 7 40.1	8.179	1	4 55 9.98	2.0843	18 27 44.7	4.927
2	3 20 39.22	1.9449	13 15 49.3	8.126	2	4 57 15.14	2.0876	18 32 37.8	4.844
3	3 22 35.99	1.9473	13 23 55.3	8.072	3	4 59 20.49	2.0909	18 37 26.0	4.761
4	3 24 32.90	1.9497	13 31 58.0	8.017	4	5 1 26.04	2.0943	18 42 9.2	4.677
5	3 26 29.96	1.9522	13 39 57.3	7.961	5	5 3 31.80	2.0976	18 46 47.3	4.593
6	3 28 27.16	1.9547	13 47 53.3	7.905	6	5 5 37.75	2.1009	18 51 20.4	4.509
7	3 30 24.52	1.9572	13 55 45.9	7.848	7	5 7 43.90	2.1043	18 55 48.4	4.423
8	3 32 22.03	1.9598	14 3 35.1	7.791	8	5 9 50.26	2.1077	19 0 11.2	4.337
9	3 34 19.70	1.9625	14 11 20.8	7.733	9	5 11 56.82	2.1110	19 4 28.8	4.250
10	3 36 17.53	1.9651	14 19 3.0	7.674	10	5 14 3.58	2.1143	19 8 41.2	4.163
11	3 38 15.51	1.9677	14 26 41.7	7.615	11	5 16 10.54	2.1177	19 12 48.4	4.076
12	3 40 13.65	1.9704	14 34 16.8	7.555	12	5 18 17.70	2.1210	19 16 50.3	3.987
13	3 42 11.96	1.9731	14 41 48.3	7.495	13	5 20 25.06	2.1243	19 20 46.9	3.898
14	3 44 10.43	1.9758	14 49 16.2	7.435	14	5 22 32.62	2.1277	19 24 38.1	3.808
15	3 46 9.06	1.9786	14 56 40.5	7.373	15	5 24 40.39	2.1311	19 28 23.9	3.718
16	3 48 7.86	1.9814	15 4 1.0	7.311	16	5 26 48.35	2.1344	19 32 4.3	3.628
17	3 50 6.83	1.9842	15 11 17.8	7.248	17	5 28 56.51	2.1377	19 35 39.2	3.537
18	3 52 5.97	1.9871	15 18 30.8	7.185	18	5 31 4.87	2.1410	19 39 8.7	3.445
19	3 54 5.28	1.9899	15 25 40.0	7.121	19	5 33 13.43	2.1443	19 42 32.6	3.353
20	3 56 4.76	1.9928	15 32 45.3	7.057	20	5 35 22.19	2.1476	19 45 51.0	3.260
21	3 58 4.42	1.9957	15 39 46.8	6.992	21	5 37 31.14	2.1509	19 49 3.8	3.166
22	4 0 4.25	1.9987	15 46 44.4	6.927	22	5 39 40.29	2.1542	19 52 10.9	3.072
23	4 2 4.26	2.0016	N. 15 53 38.0	6.860	23	5 41 49.64	2.1575	N. 19 55 12.4	2.978
SUNDAY 18.					TUESDAY 20.				
0	4 4 4.44	2.0045	N. 16 0 27.6	6.793	0	5 43 59.19	2.1607	N. 19 58 8.2	2.883
1	4 6 4.80	2.0075	16 7 13.2	6.726	1	5 46 8.93	2.1640	20 0 58.3	2.787
2	4 8 5.34	2.0106	16 13 54.7	6.658	2	5 48 18.87	2.1672	20 3 42.6	2.690
3	4 10 6.07	2.0137	16 20 32.1	6.589	3	5 50 29.00	2.1704	20 6 21.1	2.593
4	4 12 6.98	2.0167	16 27 5.4	6.520	4	5 52 39.32	2.1737	20 8 53.8	2.496
5	4 14 8.07	2.0197	16 33 34.5	6.450	5	5 54 49.84	2.1769	20 11 20.6	2.398
6	4 16 9.35	2.0228	16 39 59.4	6.379	6	5 57 0.55	2.1801	20 13 41.5	2.299
7	4 18 10.81	2.0259	16 46 20.0	6.308	7	5 59 11.45	2.1832	20 15 56.5	2.201
8	4 20 12.46	2.0291	16 52 36.3	6.237	8	6 1 22.54	2.1864	20 18 5.6	2.102
9	4 22 14.30	2.0322	16 58 48.4	6.165	9	6 3 33.82	2.1896	20 20 8.7	2.002
10	4 24 16.33	2.0354	17 4 56.1	6.092	10	6 5 45.29	2.1927	20 22 5.8	1.901
11	4 26 18.55	2.0385	17 10 59.4	6.018	11	6 7 56.94	2.1957	20 23 56.8	1.799
12	4 28 20.95	2.0417	17 16 58.3	5.944	12	6 10 8.78	2.1988	20 25 41.7	1.697
13	4 30 23.55	2.0449	17 22 52.7	5.869	13	6 12 20.80	2.2019	20 27 20.5	1.596
14	4 32 26.34	2.0482	17 28 42.6	5.794	14	6 14 33.01	2.2050	20 28 53.2	1.494
15	4 34 29.33	2.0514	17 34 28.0	5.718	15	6 16 45.40	2.2080	20 30 19.8	1.392
16	4 36 32.51	2.0546	17 40 8.8	5.642	16	6 18 57.97	2.2110	20 31 40.2	1.288
17	4 38 35.88	2.0578	17 45 45.0	5.565	17	6 21 10.72	2.2139	20 32 54.3	1.183
18	4 40 39.45	2.0611	17 51 16.6	5.487	18	6 23 23.64	2.2168	20 34 2.1	1.079
19	4 42 43.22	2.0644	17 56 43.5	5.409	19	6 25 36.74	2.2197	20 35 3.7	0.974
20	4 44 47.18	2.0677	18 2 5.7	5.330	20	6 27 50.01	2.2227	20 35 59.0	0.868
21	4 46 51.34	2.0710	18 7 23.1	5.251	21	6 30 3.46	2.2256	20 36 47.9	0.763
22	4 48 55.70	2.0743	18 12 35.8	5.171	22	6 32 17.08	2.2284	20 37 30.5	0.657
23	4 51 0.26	2.0777	18 17 43.6	5.090	23	6 34 30.87	2.2312	20 38 6.7	0.550
24	4 53 5.02	2.0810	N. 18 22 46.6	5.009	24	6 36 44.83	2.2340	N. 20 38 36.5	0.442

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
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## WEDNESDAY 21.

## FRIDAY 23.

	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>″</sup>	<sup>″</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>″</sup>	<sup>″</sup>
0	6 36 44.83	2.2340	N. 20 38 36.5	0.449	0	8 26 33.71	2.3273	N. 18 50 26.3	5.019
1	6 38 58.95	2.2368	20 38 59.8	0.335	1	8 28 53.38	2.3293	18 45 23.7	5.134
2	6 41 13.24	2.2396	20 39 16.7	0.227	2	8 31 13.11	2.3293	18 40 12.2	5.250
3	6 43 27.70	2.2423	20 39 27.1	0.119	3	8 33 32.90	2.3303	18 34 53.7	5.366
4	6 45 42.32	2.2449	20 39 31.0	+ 0.010	4	8 35 52.75	2.3313	18 29 28.3	5.481
5	6 47 57.09	2.2475	20 39 28.3	- 0.099	5	8 38 12.66	2.3322	18 23 56.0	5.596
6	6 50 12.02	2.2502	20 39 19.1	0.208	6	8 40 32.62	2.3330	18 18 16.8	5.711
7	6 52 27.11	2.2528	20 39 3.3	0.318	7	8 42 52.62	2.3338	18 12 30.7	5.825
8	6 54 42.35	2.2553	20 38 40.9	0.429	8	8 45 12.67	2.3346	18 6 37.8	5.939
9	6 56 57.75	2.2579	20 38 11.8	0.540	9	8 47 32.77	2.3353	18 0 38.0	6.053
10	6 59 13.30	2.2603	20 37 36.1	0.651	10	8 49 52.91	2.3360	17 54 31.4	6.167
11	7 1 28.99	2.2627	20 36 53.7	0.762	11	8 52 13.09	2.3366	17 48 17.9	6.281
12	7 3 44.82	2.2651	20 36 4.7	0.873	12	8 54 33.30	2.3372	17 41 57.6	6.394
13	7 6 0.80	2.2675	20 35 9.0	0.985	13	8 56 53.55	2.3378	17 35 30.6	6.507
14	7 8 16.92	2.2699	20 34 6.5	1.096	14	8 59 13.84	2.3385	17 28 56.8	6.620
15	7 10 33.19	2.2722	20 32 57.2	1.211	15	9 1 34.17	2.3391	17 22 16.2	6.732
16	7 12 49.59	2.2745	20 31 41.2	1.323	16	9 3 54.53	2.3395	17 15 28.9	6.844
17	7 15 6.13	2.2767	20 30 18.4	1.436	17	9 6 14.91	2.3399	17 8 34.9	6.956
18	7 17 22.80	2.2789	20 28 48.9	1.548	18	9 8 35.32	2.3404	17 1 34.2	7.067
19	7 19 39.60	2.2811	20 27 12.6	1.662	19	9 10 55.76	2.3408	16 54 26.9	7.177
20	7 21 56.53	2.2832	20 25 29.4	1.777	20	9 13 16.22	2.3413	16 47 13.0	7.287
21	7 24 13.59	2.2853	20 23 39.3	1.891	21	9 15 36.71	2.3417	16 39 52.5	7.397
22	7 26 30.77	2.2873	20 21 42.4	2.005	22	9 17 57.22	2.3420	16 32 25.4	7.507
23	7 28 48.07	2.2894	N. 20 19 38.7	2.119	23	9 20 17.75	2.3423	N. 16 24 51.7	7.616

## THURSDAY 22.

## SATURDAY 24.

	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>″</sup>	<sup>″</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>″</sup>	<sup>″</sup>
0	7 31 5.50	2.2914	N. 20 17 28.1	2.234	0	9 22 38.30	2.3426	N. 16 17 11.5	7.724
1	7 33 23.04	2.2933	20 15 10.6	2.349	1	9 24 58.86	2.3428	16 9 24.8	7.831
2	7 35 40.70	2.2952	20 12 46.2	2.465	2	9 27 19.44	2.3431	16 1 31.7	7.938
3	7 37 58.47	2.2971	20 10 14.8	2.581	3	9 29 40.03	2.3433	15 53 32.2	8.045
4	7 40 16.35	2.2989	20 7 36.5	2.696	4	9 32 0.63	2.3434	15 45 26.3	8.151
5	7 42 34.34	2.3007	20 4 51.3	2.811	5	9 34 21.24	2.3436	15 37 14.1	8.257
6	7 44 52.44	2.3025	20 1 59.2	2.927	6	9 36 41.87	2.3438	15 28 55.5	8.362
7	7 47 10.64	2.3042	19 59 0.1	3.043	7	9 39 2.50	2.3439	15 20 30.7	8.465
8	7 49 28.94	2.3058	19 55 54.0	3.159	8	9 41 23.14	2.3441	15 11 59.7	8.568
9	7 51 47.34	2.3075	19 52 41.0	3.275	9	9 43 43.79	2.3442	15 3 22.5	8.673
10	7 54 5.84	2.3092	19 49 21.0	3.391	10	9 46 4.44	2.3443	14 54 39.1	8.775
11	7 56 24.44	2.3107	19 45 54.0	3.507	11	9 48 25.10	2.3443	14 45 49.5	8.877
12	7 58 43.13	2.3122	19 42 20.1	3.623	12	9 50 45.76	2.3443	14 36 53.8	8.978
13	8 1 1.91	2.3137	19 38 39.2	3.740	13	9 53 6.42	2.3443	14 27 52.1	9.078
14	8 3 20.77	2.3151	19 34 51.3	3.857	14	9 55 27.08	2.3443	14 18 44.5	9.177
15	8 5 39.72	2.3165	19 30 56.4	3.973	15	9 57 47.74	2.3443	14 9 30.9	9.275
16	8 7 58.75	2.3178	19 26 54.5	4.090	16	10 0 8.40	2.3443	14 0 11.5	9.373
17	8 10 17.86	2.3192	19 22 45.6	4.206	17	10 2 29.06	2.3443	13 50 46.2	9.470
18	8 12 37.05	2.3205	19 18 29.8	4.322	18	10 4 49.72	2.3442	13 41 15.1	9.566
19	8 14 56.32	2.3217	19 14 7.0	4.438	19	10 7 10.37	2.3442	13 31 38.3	9.661
20	8 17 15.66	2.3229	19 9 37.2	4.555	20	10 9 31.02	2.3442	13 21 55.8	9.756
21	8 19 35.07	2.3241	19 5 0.4	4.671	21	10 11 51.67	2.3441	13 12 7.6	9.850
22	8 21 54.55	2.3252	19 0 16.7	4.787	22	10 14 12.31	2.3440	13 2 13.8	9.942
23	8 24 14.10	2.3263	18 55 26.0	4.903	23	10 16 32.95	2.3439	12 52 14.5	10.034
24	8 26 33.71	2.3273	N. 18 50 28.3	5.019	24	10 18 53.58	2.3438	N. 12 42 9.7	10.126

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 25.					TUESDAY 27.				
0	10 18 53.58	2.3438	N. 12° 42' 9.7"	10.125	0	12 11 20.70	2.3462	N. 3° 12' 35.6"	13.109
1	10 21 14.21	2.3437	12 31 59.5	10.215	1	12 13 41.49	2.3467	2 59 28.2	13.137
2	10 23 34.83	2.3436	12 21 43.9	10.304	2	12 16 2.30	2.3471	2 46 19.2	13.163
3	10 25 55.41	2.3435	12 11 23.0	10.392	3	12 18 23.14	2.3476	2 33 8.6	13.188
4	10 28 16.05	2.3434	12 0 56.9	10.479	4	12 20 44.01	2.3482	2 19 56.6	13.211
5	10 30 36.65	2.3433	11 50 25.5	10.566	5	12 23 4.92	2.3487	2 6 43.3	13.232
6	10 32 57.24	2.3431	11 39 49.0	10.651	6	12 25 25.86	2.3493	1 53 28.7	13.252
7	10 35 17.82	2.3430	11 29 7.4	10.735	7	12 27 46.84	2.3499	1 40 13.0	13.271
8	10 37 38.40	2.3429	11 18 20.8	10.817	8	12 30 7.85	2.3505	1 26 56.2	13.287
9	10 39 58.97	2.3428	11 7 29.3	10.899	9	12 32 28.90	2.3512	1 13 38.5	13.302
10	10 42 19.53	2.3427	10 56 32.9	10.981	10	12 34 49.99	2.3519	1 0 19.9	13.316
11	10 44 40.09	2.3426	10 45 31.6	11.061	11	12 37 11.13	2.3526	0 47 0.6	13.327
12	10 47 0.64	2.3424	10 34 25.6	11.139	12	12 39 32.31	2.3533	0 33 10.7	13.337
13	10 49 21.18	2.3423	10 23 14.9	11.217	13	12 41 53.53	2.3541	0 20 20.2	13.346
14	10 51 41.72	2.3422	10 11 59.6	11.293	14	12 44 14.80	2.3549	N. 0 6 59.2	13.353
15	10 54 2.25	2.3422	10 0 39.7	11.368	15	12 46 36.12	2.3557	S. 0 6 22.1	13.358
16	10 56 22.78	2.3421	9 49 15.4	11.442	16	12 48 57.49	2.3566	0 19 43.7	13.361
17	10 58 43.30	2.3419	9 37 46.7	11.515	17	12 51 18.91	2.3574	0 33 5.4	13.369
18	11 1 3.81	2.3418	9 26 13.6	11.587	18	12 53 40.38	2.3583	0 46 27.2	13.363
19	11 3 24.32	2.3418	9 14 36.3	11.657	19	12 56 1.90	2.3592	0 59 49.0	13.362
20	11 5 44.83	2.3417	9 2 54.8	11.727	20	12 58 23.48	2.3602	1 13 10.6	13.358
21	11 8 5.33	2.3417	8 51 9.1	11.795	21	13 0 45.12	2.3612	1 26 32.0	13.353
22	11 10 25.83	2.3417	8 39 19.4	11.862	22	13 3 6.82	2.3622	1 39 53.0	13.347
23	11 12 46.33	2.3417	N. 8 27 25.7	11.927	23	13 5 28.58	2.3632	S. 1 53 13.6	13.338
MONDAY 26.					WEDNESDAY 28.				
0	11 15 6.83	2.3417	N. 8 15 28.2	11.990	0	13 7 50.40	2.3642	S. 2 6 33.6	13.328
1	11 17 27.33	2.3417	8 3 26.9	12.053	1	13 10 12.28	2.3653	2 19 53.0	13.317
2	11 19 47.83	2.3416	7 51 21.8	12.115	2	13 12 34.23	2.3664	2 33 11.6	13.303
3	11 22 8.32	2.3416	7 39 13.1	12.175	3	13 14 56.25	2.3676	2 46 29.4	13.288
4	11 24 28.82	2.3417	7 27 0.8	12.234	4	13 17 18.34	2.3687	2 59 46.2	13.272
5	11 26 49.32	2.3417	7 14 45.0	12.292	5	13 19 40.50	2.3698	3 13 2.0	13.253
6	11 29 9.82	2.3418	7 2 25.8	12.348	6	13 22 2.72	2.3710	3 26 16.6	13.233
7	11 31 30.33	2.3418	6 50 3.3	12.403	7	13 24 25.02	2.3722	3 39 30.0	13.212
8	11 33 50.84	2.3419	6 37 37.5	12.456	8	13 26 47.39	2.3735	3 52 42.0	13.188
9	11 36 11.36	2.3421	6 25 8.6	12.507	9	13 29 9.84	2.3748	4 5 52.5	13.163
10	11 38 31.89	2.3422	6 12 36.6	12.558	10	13 31 32.37	2.3761	4 19 1.5	13.136
11	11 40 52.43	2.3423	6 0 1.6	12.607	11	13 33 54.98	2.3774	4 32 8.8	13.107
12	11 43 12.97	2.3424	5 47 23.8	12.654	12	13 36 17.66	2.3787	4 45 14.3	13.077
13	11 45 33.52	2.3426	5 34 43.2	12.700	13	13 38 40.42	2.3801	4 58 18.0	13.045
14	11 47 54.09	2.3429	5 21 59.8	12.746	14	13 41 3.27	2.3815	5 11 19.7	13.012
15	11 50 14.67	2.3431	5 9 13.7	12.789	15	13 43 26.20	2.3828	5 24 19.4	12.977
16	11 52 35.26	2.3434	4 56 25.1	12.831	16	13 45 49.21	2.3842	5 37 16.9	12.939
17	11 54 55.87	2.3437	4 43 31.0	12.871	17	13 48 12.31	2.3857	5 50 12.1	12.901
18	11 57 16.50	2.3440	4 30 40.6	12.909	18	13 50 35.50	2.3872	6 3 5.0	12.861
19	11 59 37.15	2.3443	4 17 44.9	12.947	19	13 52 58.78	2.3887	6 15 55.4	12.818
20	12 1 57.82	2.3446	4 4 47.0	12.982	20	13 55 22.14	2.3901	6 28 43.2	12.775
21	12 4 18.50	2.3449	3 51 47.1	13.015	21	13 57 45.59	2.3916	6 41 28.4	12.730
22	12 6 39.21	2.3453	3 38 45.2	13.048	22	14 0 9.13	2.3932	6 54 10.8	12.683
23	12 8 59.94	2.3457	3 25 41.3	13.080	23	14 2 32.77	2.3947	7 6 50.4	12.636
24	12 11 20.70	2.3462	N. 3 12 35.6	13.109	24	14 4 56.50	2.3962	S. 7 19 27.1	12.586



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>b</sup> .	P. L. of Diff.	VI <sup>b</sup> .	P. L. of Diff.	IX <sup>b</sup> .	P. L. of Diff.
1	SATURN W.	82° 11' 21"	2111	84° 2' 4"	2115	85° 52' 40"	2120	87° 43' 8"	2126
	Regulus W.	54 24 52	2126	56 15 12	2130	58 5 25	2135	59 55 30	2141
	JUPITER E.	43 13 39	2163	41 24 16	2169	39 35 2	2176	37 45 58	2184
	Antares E.	46 32 50	2233	44 45 12	2245	42 57 52	2259	41 10 52	2274
	VENUS E.	105 10 1	2499	103 28 46	2504	101 47 39	2511	100 6 41	2517
2	Regulus W.	69 3 33	2175	70 52 38	2183	72 41 31	2192	74 30 11	2200
	α Aquilæ E.	81 16 38	2748	79 41 2	2763	78 5 45	2778	76 30 48	2795
	VENUS E.	91 44 11	2554	90 4 13	2563	88 24 27	2572	86 44 53	2581
	SUN E.	124 55 39	2491	123 14 13	2499	121 32 58	2507	119 51 55	2517
3	Regulus W.	83 30 13	2247	85 17 31	2257	87 4 34	2266	88 51 23	2277
	Spica W.	30 19 53	2370	32 4 11	2368	33 48 31	2368	35 32 51	2370
	MARS W.	21 40 0	2277	23 26 34	2282	25 13 0	2289	26 59 16	2296
	α Aquilæ E.	68 42 29	2908	67 10 20	2935	65 38 46	2965	64 7 50	2997
	VENUS E.	78 30 25	2632	76 52 14	2643	75 14 18	2654	73 36 36	2666
	SUN E.	111 29 58	2566	109 50 16	2577	108 10 49	2588	106 31 37	2599
4	Spica W.	44 13 21	2395	45 57 3	2403	47 40 34	2410	49 23 55	2418
	MARS W.	35 47 37	2340	37 32 38	2350	39 17 25	2359	41 1 58	2369
	α Aquilæ E.	56 43 57	3194	55 17 41	3249	53 52 22	3294	52 28 4	3351
	VENUS E.	65 32 0	2734	63 55 52	2736	62 20 0	2748	60 44 24	2760
	SUN E.	98 19 27	2656	96 41 48	2668	95 4 25	2680	93 27 18	2692
5	Spica W.	57 57 39	2469	59 39 45	2479	61 21 38	2481	63 3 18	2491
	MARS W.	49 41 8	2430	51 24 14	2430	53 7 6	2440	54 49 44	2450
	α Aquilæ E.	45 44 31	3715	44 28 0	3810	43 13 8	3914	42 0 2	4027
	VENUS E.	52 50 20	2921	51 16 19	2932	49 42 33	2945	48 9 3	2956
	SUN E.	85 25 40	2751	83 50 8	2763	82 14 52	2775	80 39 52	2787
6	Spica W.	71 28 12	2540	73 8 30	2550	74 48 34	2560	76 28 24	2569
	MARS W.	63 19 18	2501	65 0 30	2510	66 41 29	2520	68 22 14	2530
	JUPITER W.	27 41 8	2559	29 20 59	2566	31 0 41	2573	32 40 13	2581
	Antares W.	26 29 17	2779	28 4 13	2761	29 39 32	2747	31 15 9	2737
	VENUS E.	40 25 22	2916	38 53 23	2927	37 21 39	2939	35 50 9	2950
	SUN E.	72 48 42	2846	71 15 14	2857	69 42 0	2869	68 9 1	2880
7	Spica W.	84 44 13	2618	86 22 43	2629	88 0 59	2638	89 39 2	2648
	MARS W.	76 42 40	2577	78 22 6	2587	80 1 19	2596	81 40 20	2604
	JUPITER W.	40 55 12	2691	42 33 38	2629	44 11 53	2638	45 49 56	2647
	Antares W.	39 15 29	2791	40 51 41	2792	42 27 52	2794	44 4 0	2797
	SUN E.	60 27 46	2937	58 56 14	2947	57 24 55	2958	55 53 50	2969
8	JUPITER W.	53 57 16	2689	55 34 10	2698	57 10 52	2707	58 47 23	2715
	Antares W.	52 3 27	2749	53 39 2	2755	55 14 29	2760	56 49 49	2766
	SUN E.	48 21 51	3093	46 52 7	3034	45 22 36	3045	43 53 19	3056
9	JUPITER W.	66 47 10	2757	68 22 34	2765	69 57 48	2773	71 32 51	2782
	Antares W.	64 44 23	2799	66 18 52	2806	67 53 12	2813	69 27 23	2821
	SUN E.	36 30 11	3110	35 2 13	3121	33 34 29	3132	32 6 58	3143
10	JUPITER W.	79 25 27	2891	80 59 27	2902	82 33 17	2937	84 6 57	2945
	Antares W.	77 15 55	2957	78 49 9	2964	80 22 14	2972	81 55 9	2980

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	SATURN W.	89° 33' 27"	2132	91° 23' 37"	2139	93° 13' 37"	2146	95° 3' 26"	2153
	Regulus W.	61 45 26	2147	63 35 13	2154	65 24 50	2161	67 14 17	2168
	JUPITER E.	35 57 6	2192	34 8 26	2201	32 20 0	2211	30 31 49	2223
	Antares E.	39 24 14	2291	37 38 1	2310	35 52 16	2331	34 7 2	2355
	VENUS E.	98 25 52	2524	96 45 12	2530	95 4 41	2538	93 24 20	2546
2	Regulus W.	76 18 38	2209	78 6 52	2218	79 54 53	2227	81 42 40	2237
	α Aquilæ E.	74 56 14	2215	73 22 6	2235	71 48 24	2252	70 15 11	2262
	VENUS E.	85 5 32	2521	83 26 25	2501	81 47 31	2461	80 8 51	2421
	SUN E.	118 11 5	2526	116 30 28	2535	114 50 4	2545	113 9 54	2556
3	Regulus W.	90 37 56	2227	92 24 14	2228	94 10 16	2309	95 56 3	2319
	Spica W.	37 17 9	2373	39 1 22	2378	40 45 29	2382	42 29 29	2386
	MARS W.	28 45 21	2304	30 31 14	2313	32 16 55	2329	34 2 23	2331
	α Aquilæ E.	62 37 33	2032	61 7 59	2062	59 39 10	2106	58 11 8	2148
	VENUS E.	71 59 10	2277	70 21 59	2289	68 45 4	2700	67 8 24	2712
	SUN E.	104 52 40	2610	103 13 58	2621	101 35 32	2633	99 57 22	2644
4	Spica W.	51 7 4	2426	52 50 1	2435	54 32 46	2443	56 15 19	2453
	MARS W.	42 46 17	2379	44 30 22	2389	46 14 12	2400	47 57 47	2410
	α Aquilæ E.	51 4 52	2414	49 42 50	2479	48 22 2	2551	47 2 34	2599
	VENUS E.	59 9 3	2772	57 33 59	2784	55 59 10	2796	54 24 37	2808
	SUN E.	91 50 27	2704	90 13 52	2715	88 37 32	2727	87 1 28	2739
5	Spica W.	64 44 44	2501	66 25 56	2510	68 6 55	2520	69 47 40	2530
	MARS W.	56 32 7	2460	58 14 16	2470	59 56 11	2480	61 37 52	2491
	α Aquilæ E.	40 48 49	4154	39 39 39	4223	38 32 40	4448	37 28 2	4623
	VENUS E.	46 35 48	2262	45 2 48	2280	43 30 4	2292	41 57 35	2295
	SUN E.	79 5 7	2729	77 30 38	2811	75 56 24	2822	74 22 25	2835
6	Spica W.	78 8 1	2520	79 47 24	2529	81 26 34	2539	83 5 30	2549
	MARS W.	70 2 46	2540	71 43 4	2549	73 23 9	2559	75 3 1	2568
	JUPITER W.	34 19 34	2528	35 58 45	2526	37 37 45	2604	39 16 34	2612
	Antares W.	32 51 0	2729	34 27 1	2725	36 3 8	2722	37 39 18	2722
	VENUS E.	34 18 54	2262	32 47 53	2273	31 17 6	2285	29 46 34	2295
	SUN E.	66 36 17	2292	65 3 48	2293	63 31 33	2294	61 59 32	2296
7	Spica W.	91 16 52	2657	92 54 29	2667	94 31 53	2677	96 9 4	2686
	MARS W.	83 19 9	2613	84 57 46	2623	86 36 10	2632	88 14 22	2640
	JUPITER W.	47 27 47	2655	49 5 27	2664	50 42 55	2673	52 20 11	2681
	Antares W.	45 40 4	2731	47 16 3	2735	48 51 57	2739	50 27 45	2744
	SUN E.	54 22 59	2281	52 52 22	2291	51 21 58	2302	49 51 48	2313
8	JUPITER W.	60 23 43	2722	61 59 52	2722	63 35 49	2741	65 11 35	2749
	Antares W.	58 25 1	2772	60 0 4	2779	61 34 59	2786	63 9 45	2792
	SUN E.	42 24 15	2068	40 55 24	2077	39 26 46	2088	37 58 22	2099
9	JUPITER W.	73 7 43	2729	74 42 25	2728	76 16 56	2805	77 51 17	2814
	Antares W.	71 1 24	2822	72 35 16	2835	74 8 58	2842	75 42 31	2849
	SUN E.	30 39 41	3156	29 12 39	3168	27 45 51	3180	26 19 18	3193
10	JUPITER W.	85 40 26	2852	87 13 45	2861	88 46 54	2868	90 19 54	2875
	Antares W.	83 27 54	2887	85 0 30	2894	86 32 56	2902	88 5 12	2910



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III.	P. L. of Diff.	VI.	P. L. of Diff.	IX.	P. L. of Diff.
10	SUN	E.	24 53 1	3208	23 27 1	3223	22 1 19	3239	20 35 56	3256
14	SUN	W.	20 43 6	3466	22 4 8	3464	23 25 12	3463	24 46 17	3463
	Aldebaran	E.	53 25 26	3026	51 55 45	3030	50 26 10	3035	48 56 41	3040
	SATURN	E.	105 15 48	3014	103 45 53	3020	102 16 5	3025	100 46 23	3030
15	SUN	W.	31 31 28	3471	32 52 25	3479	34 13 20	3474	35 34 13	3475
	Aldebaran	E.	41 30 41	3061	40 1 44	3065	38 32 51	3069	37 4 3	3072
	Pollux	E.	85 46 34	3104	84 18 29	3108	82 50 29	3111	81 22 33	3114
	SATURN	E.	93 19 20	3051	91 50 10	3054	90 21 4	3057	88 52 2	3060
16	SUN	W.	42 18 18	3480	43 39 4	3480	44 59 49	3481	46 20 35	3480
	Aldebaran	E.	29 40 50	3062	28 12 19	3063	26 43 49	3065	25 15 21	3066
	Pollux	E.	74 3 47	3128	72 36 11	3129	71 8 37	3130	69 41 4	3131
	SATURN	E.	81 27 42	3071	79 58 57	3079	78 30 13	3073	77 1 30	3073
17	SUN	W.	53 4 34	3475	54 25 26	3472	55 46 21	3470	57 7 19	3466
	Pollux	E.	62 23 40	3136	60 56 14	3135	59 28 47	3134	58 1 19	3133
	SATURN	E.	69 37 58	3070	68 9 12	3069	66 40 25	3068	65 11 36	3065
	Regulus	E.	98 1 16	3079	96 32 41	3078	95 4 4	3076	93 35 25	3073
18	SUN	W.	63 53 13	3444	65 14 40	3438	66 36 13	3439	67 57 53	3426
	$\alpha$ Arietis	W.	29 47 53	3719	31 4 20	3658	32 21 52	3604	33 40 22	3556
	Pollux	E.	50 43 44	3129	49 16 9	3126	47 48 31	3124	46 20 51	3123
	SATURN	E.	57 46 32	3047	56 17 17	3041	54 47 55	3036	53 18 27	3030
	Regulus	E.	86 11 11	3054	84 42 5	3049	83 12 53	3043	81 43 34	3038
19	SUN	W.	74 48 16	3386	76 10 49	3376	77 33 33	3365	78 56 29	3356
	$\alpha$ Arietis	W.	40 24 39	3371	41 47 29	3340	43 10 54	3313	44 34 51	3285
	Pollux	E.	39 2 1	3115	37 34 10	3115	36 6 19	3115	34 38 28	3116
	SATURN	E.	45 49 9	2995	44 18 50	2996	42 48 20	2977	41 17 39	2969
	Regulus	E.	74 14 59	3001	72 44 48	2993	71 14 26	2983	69 43 52	2974
20	SUN	W.	85 54 17	3296	87 18 33	3283	88 43 4	3270	90 7 51	3255
	$\alpha$ Arietis	W.	51 42 4	3166	53 8 54	3144	54 36 10	3124	56 3 51	3109
	Aldebaran	W.	18 4 13	2925	19 36 0	2912	21 8 4	2899	22 40 24	2886
	SATURN	E.	33 41 10	2916	32 9 11	2904	30 36 57	2892	29 4 28	2880
	Regulus	E.	62 7 56	2920	60 36 2	2908	59 3 53	2895	57 31 28	2883
21	SUN	W.	97 16 6	3179	98 42 40	3163	100 9 34	3145	101 36 49	3129
	$\alpha$ Arietis	W.	63 28 41	2999	64 58 55	2979	66 29 34	2959	68 0 38	2939
	Aldebaran	W.	30 26 35	2912	32 0 47	2977	33 35 19	2768	35 10 11	2765
	Regulus	E.	49 45 5	2912	48 10 53	2797	46 36 21	2781	45 1 28	2766
	Spica	E.	103 34 0	2944	102 0 29	2898	100 26 38	2912	98 52 26	2796
22	SUN	W.	108 58 21	3038	110 27 47	3019	111 57 36	3001	113 27 48	2981
	Aldebaran	W.	43 10 1	2980	44 47 8	2963	46 24 38	2944	48 2 33	2936
	Regulus	E.	37 1 44	2981	35 24 39	2964	33 47 11	2947	32 9 20	2929
	Spica	E.	90 56 0	2710	89 19 34	2693	87 42 45	2675	86 5 32	2657
	MARS	E.	96 54 26	2907	95 15 40	2958	93 36 29	2970	91 56 53	2952
23	SUN	W.	121 4 57	2983	122 37 38	2963	124 10 44	2944	125 44 15	2925

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Dist.	XV <sup>h</sup>	P. L. of Dist.	XVIII <sup>h</sup> .	P. L. of Dist.	XXI <sup>h</sup> .	P. L. of Dist.
10	SUN	E.	19 10 53	3376	17 46 13	3390	16 22 0	3396	14 58 19	3380
14	SUN	W.	26 7 22	3464	27 28 26	3466	28 49 28	3467	30 10 29	3469
	Aldebaran	E.	47 27 18	3044	45 58 0	3049	44 28 48	3054	42 59 42	3058
	SATURN	E.	99 16 48	3034	97 47 18	3039	96 17 54	3043	94 48 35	3047
15	SUN	W.	36 55 5	3476	38 15 56	3478	39 36 45	3480	40 57 32	3480
	Aldebaran	E.	35 35 19	3074	34 6 38	3076	32 37 59	3078	31 9 23	3081
	Pollux	E.	79 54 41	3118	78 26 53	3120	76 59 8	3123	75 31 26	3126
	SATURN	E.	87 23 4	3063	85 54 9	3065	84 25 17	3068	82 56 28	3070
16	SUN	W.	47 41 21	3479	49 2 8	3479	50 22 55	3478	51 43 44	3477
	Aldebaran	E.	23 46 54	3086	22 18 27	3087	20 50 1	3087	19 21 36	3087
	Pollux	E.	68 13 32	3133	66 46 2	3133	65 18 33	3135	63 51 6	3136
	SATURN	E.	75 32 48	3073	74 4 6	3073	72 35 24	3073	71 6 42	3073
17	SUN	W.	58 28 21	3463	59 49 27	3459	61 10 37	3454	62 31 52	3449
	Pollux	E.	56 33 50	3133	55 6 20	3132	53 38 49	3131	52 11 17	3130
	SATURN	E.	63 42 44	3062	62 13 48	3058	60 44 47	3055	59 15 42	3051
	Regulus	E.	92 6 43	3070	90 37 57	3066	89 9 6	3063	87 40 11	3059
18	SUN	W.	69 19 40	3419	70 41 35	3411	72 3 39	3409	73 25 53	3394
	$\alpha$ Arietis	W.	34 59 44	3513	36 19 54	3472	37 40 49	3436	39 2 25	3402
	Pollux	E.	44 53 9	3121	43 25 25	3119	41 57 39	3118	40 29 51	3116
	SATURN	E.	51 48 52	3024	50 19 9	3018	48 49 18	3010	47 19 18	3003
	Regulus	E.	80 14 8	3031	78 44 34	3025	77 14 52	3017	75 45 0	3009
19	SUN	W.	80 19 36	3345	81 42 56	3333	83 6 29	3321	84 30 16	3309
	$\alpha$ Arietis	W.	45 59 20	3259	47 24 19	3236	48 49 46	3212	50 15 41	3186
	Pollux	E.	33 10 38	3118	31 42 50	3122	30 15 7	3128	28 47 31	3135
	SATURN	E.	39 46 47	2959	38 15 43	2949	36 44 26	2938	35 12 55	2927
	Regulus	E.	68 13 7	2965	66 42 10	2954	65 10 59	2943	63 39 35	2931
20	SUN	W.	91 32 55	3341	92 58 16	3296	94 23 54	3210	95 49 51	3196
	$\alpha$ Arietis	W.	57 31 58	3081	59 0 31	3060	60 29 29	3040	61 58 52	3019
	Aldebaran	W.	24 13 1	2872	25 45 56	2857	27 19 10	2842	28 52 43	2828
	SATURN	E.	27 31 43	2867	25 58 42	2854	24 25 24	2841	22 51 49	2827
	Regulus	E.	55 58 47	2869	54 25 49	2855	52 52 33	2841	51 18 58	2827
21	SUN	W.	103 4 24	3111	104 32 20	3093	106 0 38	3075	107 29 18	3056
	$\alpha$ Arietis	W.	69 32 7	2920	71 4 1	2900	72 36 20	2880	74 9 5	2859
	Aldebaran	W.	36 45 25	2749	38 21 0	2732	39 56 57	2715	41 33 17	2697
	Regulus	E.	43 26 15	2750	41 50 41	2733	40 14 45	2716	38 38 26	2698
	Spica	E.	97 17 53	2779	95 42 58	2763	94 7 41	2746	92 32 2	2739
22	SUN	W.	114 58 25	2961	116 29 26	2942	118 0 51	2923	119 32 41	2902
	Aldebaran	W.	49 40 52	2608	51 19 36	2589	52 58 46	2571	54 38 21	2552
	Regulus	E.	30 31 5	2611	28 52 25	2593	27 13 21	2575	25 33 52	2557
	Spica	E.	84 27 55	2639	82 49 53	2621	81 11 27	2603	79 32 36	2585
	MARS	E.	90 16 52	2533	88 36 25	2515	86 55 33	2497	85 14 15	2477
23	SUN	W.	127 18 11	2805	128 52 33	2785	130 27 21	2766	132 2 34	2747

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
23	Aldebaran	W.	56° 18' 22"	2533	57° 58' 49"	2514	59° 39' 43"	2495	61° 21' 3"	2477
	Spica	E.	77 53 20	2506	76 13 38	2548	74 33 31	2529	72 52 58	2511
	Mars	E.	83 32 30	2458	81 50 18	2440	80 7 40	2421	78 24 35	2401
24	Aldebaran	W.	69 54 23	2382	71 38 24	2364	73 22 51	2345	75 7 45	2327
	Pollux	W.	26 50 11	2591	28 29 18	2551	30 9 21	2514	31 50 15	2486
	SATURN	W.	18 18 28	2389	20 2 19	2368	21 46 40	2348	23 31 29	2330
	Spica	E.	64 23 54	2431	62 40 49	2404	60 57 20	2387	59 13 27	2371
	Mars	E.	69 42 20	2307	67 56 31	2289	66 10 15	2270	64 23 32	2252
	JUPITER	E.	108 23 29	2388	106 39 37	2369	104 55 18	2350	103 10 32	2333
25	Aldebaran	W.	83 58 44	2241	85 46 11	2224	87 34 3	2207	89 22 20	2191
	Pollux	W.	40 25 46	2340	42 10 47	2317	43 56 21	2295	45 42 28	2274
	SATURN	W.	32 22 18	2240	34 9 46	2223	35 57 39	2207	37 45 56	2191
	Spica	E.	50 28 14	2295	48 42 7	2281	46 55 40	2269	45 8 55	2258
	Mars	E.	55 23 21	2166	53 34 2	2150	51 44 19	2134	49 54 11	2118
	JUPITER	E.	94 20 7	2244	92 32 45	2228	90 44 59	2212	88 56 49	2198
	Antares	E.	96 22 20	2283	94 36 10	2277	92 49 36	2260	91 2 38	2244
26	Pollux	W.	54 40 15	2184	56 29 7	2169	58 18 22	2155	60 7 58	2141
	SATURN	W.	46 53 4	2120	48 43 3	2107	50 34 21	2095	52 25 28	2084
	Regulus	W.	18 22 5	2130	20 12 18	2116	22 2 53	2103	23 53 48	2090
	Spica	E.	36 11 23	2217	34 23 21	2214	32 35 14	2213	30 47 6	2216
	Mars	E.	40 37 55	2050	38 45 38	2037	36 53 2	2026	35 0 9	2016
	JUPITER	E.	79 50 16	2124	77 59 54	2112	76 9 13	2100	74 18 14	2089
	Antares	E.	82 2 13	2174	80 13 7	2163	78 23 43	2151	76 34 2	2141
27	Pollux	W.	69 20 42	2086	71 12 3	2077	73 3 37	2070	74 55 23	2068
	SATURN	W.	61 45 6	2037	63 37 43	2029	65 30 32	2023	67 23 31	2016
	Regulus	W.	33 12 44	2041	35 5 15	2033	36 57 58	2026	38 50 52	2019
	JUPITER	E.	64 59 16	2042	63 6 47	2035	61 14 7	2028	59 21 17	2023
	Antares	E.	67 22 0	2100	65 31 1	2094	63 39 53	2090	61 48 30	2088
28	SATURN	W.	76 50 23	1998	78 44 0	1997	80 37 39	1996	82 31 19	1996
	Regulus	W.	48 17 23	2001	50 10 56	1999	52 4 32	1998	53 58 10	1998
	JUPITER	E.	49 55 22	2007	48 1 59	2006	46 8 34	2006	44 15 9	2007
	Antares	E.	52 31 38	2085	50 40 16	2088	48 48 59	2093	46 57 49	2099
29	Regulus	W.	63 25 54	2010	65 19 13	2014	67 12 25	2019	69 5 30	2024
	JUPITER	E.	34 49 0	2026	32 56 7	2033	31 3 25	2042	29 10 57	2052
	Antares	E.	37 45 16	2158	35 55 45	2176	34 6 42	2198	32 18 12	2225
30	Regulus	W.	78 28 21	2063	80 20 17	2072	82 11 59	2082	84 3 26	2093
	Spica	W.	25 25 56	2229	27 13 41	2218	29 1 41	2212	30 49 50	2209
	Mars	W.	20 53 6	1999	22 46 42	2004	24 40 10	2010	26 33 28	2018
	α Aquilæ	E.	73 8 6	2690	71 31 13	2714	69 54 52	2740	68 19 5	2767
31	Regulus	W.	93 16 22	2153	95 6 1	2166	96 55 20	2179	98 44 19	2192
	Spica	W.	39 50 32	2227	41 38 19	2235	43 25 55	2243	45 13 18	2253
	Mars	W.	35 56 36	2067	37 48 26	2079	39 39 58	2090	41 31 12	2103
	α Aquilæ	E.	60 30 17	2245	58 58 55	2289	57 28 29	2307	55 59 2	2369
	SUN	E.	129 27 32	2476	127 45 45	2489	126 4 17	2504	124 23 9	2518

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
23	Aldebaran W.	63° 2' 49"	2458	64° 45' 2"	2438	66° 27' 42"	2419	68° 10' 49"	2401
	Spica E.	71 12 0	2483	69 30 37	2475	67 48 48	2457	66 6 34	2438
	Mars E.	76 41 2	2382	74 57 2	2364	73 12 35	2345	71 27 41	2326
24	Aldebaran W.	76 53 5	2309	78 38 51	2291	80 25 3	2274	82 11 41	2257
	Pollux W.	33 31 57	2448	35 14 24	2418	36 57 33	2391	38 41 21	2365
	Saturn W.	25 16 45	2311	27 2 28	2283	28 48 38	2274	30 35 15	2257
	Spica E.	57 29 10	2354	55 44 29	2339	53 59 26	2324	52 14 1	2309
	Mars E.	62 36 22	2235	60 48 46	2216	59 0 43	2200	57 12 15	2184
	Jupiter E.	101 25 20	2314	99 39 41	2296	97 53 35	2279	96 7 4	2261
25	Aldebaran W.	91 11 1	2176	93 0 4	2162	94 49 29	2147	96 39 16	2134
	Pollux W.	47 29 5	2255	49 16 11	2235	51 3 46	2217	52 51 48	2200
	Saturn W.	39 34 37	2176	41 23 41	2161	43 13 7	2147	45 2 55	2133
	Spica E.	43 21 53	2247	41 34 35	2237	39 47 3	2222	37 59 18	2209
	Mars E.	48 3 40	2103	46 12 46	2089	44 21 30	2075	42 29 53	2062
	Jupiter E.	87 8 15	2180	85 19 18	2166	83 29 59	2151	81 40 18	2137
	Antares E.	89 15 16	2229	87 27 31	2214	85 39 25	2201	83 50 59	2186
26	Pollux W.	61 57 54	2128	63 48 10	2116	65 38 44	2105	67 29 35	2095
	Saturn W.	54 16 52	2073	56 8 33	2062	58 0 30	2053	59 52 41	2044
	Regulus W.	25 45 2	2079	27 36 34	2068	29 28 22	2058	31 20 26	2049
	Spica E.	28 59 2	2221	27 11 6	2231	25 23 24	2246	23 36 5	2260
	Mars E.	33 6 59	2006	31 13 34	1998	29 19 56	1990	27 26 6	1983
	Jupiter E.	72 26 58	2078	70 35 25	2068	68 43 36	2059	66 51 33	2050
	Antares E.	74 44 5	2131	72 53 53	2122	71 3 27	2114	69 12 49	2107
27	Pollux W.	76 47 20	2057	78 39 26	2052	80 31 39	2048	82 23 59	2044
	Saturn W.	69 16 40	2011	71 9 57	2007	73 3 20	2003	74 56 49	2000
	Regulus W.	40 43 56	2014	42 37 9	2010	44 30 28	2006	46 23 53	2003
	Jupiter E.	57 28 19	2018	55 35 13	2014	53 42 1	2010	51 48 43	2009
	Antares E.	59 57 19	2084	58 5 55	2083	56 14 29	2083	54 23 3	2083
28	Saturn W.	84 24 59	1997	86 18 38	1999	88 12 14	2001	90 5 46	2004
	Regulus W.	55 51 48	1998	57 45 25	2000	59 38 59	2003	61 32 29	2006
	Jupiter E.	42 21 46	2009	40 28 26	2019	38 35 11	2016	36 42 2	2021
	Antares E.	45 6 49	2107	43 16 1	2116	41 25 27	2128	39 35 11	2142
29	Regulus W.	70 58 27	2031	72 51 13	2038	74 43 48	2046	76 36 11	2054
	Jupiter E.	27 18 44	2063	25 26 48	2075	23 35 11	2090	21 43 57	2109
	Antares E.	30 30 21	2255	28 43 15	2290	26 57 1	2339	25 11 48	2383
30	Regulus W.	85 54 36	2104	87 45 29	2115	89 36 5	2127	91 26 23	2139
	Spica W.	32 38 4	2208	34 26 19	2210	36 14 31	2215	38 2 36	2221
	Mars W.	28 26 34	2096	30 19 27	2035	32 12 6	2046	34 4 29	2056
	$\alpha$ Aquilæ E.	66 43 54	2798	65 9 23	2830	63 35 34	2886	62 2 31	2904
31	Regulus W.	100 32 58	2206	102 21 16	2221	104 9 12	2236	105 56 46	2251
	Spica W.	47 0 26	2264	48 47 18	2275	50 33 54	2287	52 20 13	2299
	Mars W.	43 22 6	2116	45 12 40	2130	47 2 54	2143	48 52 48	2157
	$\alpha$ Aquilæ E.	54 30 39	3144	53 3 23	3204	51 37 19	3270	50 12 32	3341
	Sun E.	122 42 21	2533	121 1 53	2547	119 21 45	2561	117 41 57	2577

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Subtracted from Apparent Time.			
SUN.	1	<sup>h</sup> 0 <sup>m</sup> 44 <sup>s</sup> 51.99	<sup>s</sup> 9.100	N. <sup>°</sup> 4 <sup>'</sup> 49 <sup>"</sup> 25.4	+57.67	16' 1.94	<sup>s</sup> 64.52	<sup>m</sup> 3 <sup>s</sup> 45.50	<sup>s</sup> 0.754	
Mon.	2	0 48 30.47	9.106	5 12 27.0	57.45	16 1.65	64.54	3 27.48	0.748	
Tues.	3	0 52 9.10	9.113	5 35 23.1	57.22	16 1.36	64.56	3 9.61	0.741	
Wed.	4	0 55 47.92	9.121	5 58 13.4	+56.97	16 1.08	64.59	2 51.91	0.733	
Thur.	5	0 59 26.93	9.130	6 20 57.6	56.71	16 0.80	64.61	2 34.41	0.724	
Frid.	6	1 3 6.15	9.139	6 43 35.5	56.44	16 0.52	64.64	2 17.13	0.715	
Sat.	7	1 6 45.59	9.149	7 6 6.7	+56.15	16 0.24	64.67	2 0.08	0.705	
SUN.	8	1 10 25.28	9.159	7 28 30.6	55.84	15 59.96	64.71	1 43.26	0.695	
Mon.	9	1 14 5.24	9.170	7 50 47.0	55.52	15 59.68	64.75	1 26.71	0.684	
Tues.	10	1 17 45.48	9.182	8 12 55.6	+55.19	15 59.41	64.79	1 10.44	0.672	
Wed.	11	1 21 26.00	9.194	8 34 56.1	54.84	15 59.14	64.83	0 54.46	0.660	
Thur.	12	1 25 6.82	9.207	8 56 48.1	54.47	15 58.87	64.88	0 38.77	0.647	
Frid.	13	1 28 47.95	9.220	9 18 31.0	+54.09	15 58.60	64.92	0 23.38	0.634	
Sat.	14	1 32 29.40	9.234	9 40 4.7	53.70	15 58.34	64.97	0 8.32	0.620	
SUN.	15	1 36 11.19	9.248	10 1 28.8	53.29	15 58.08	65.02	0 6.40	0.606	
Mon.	16	1 39 53.32	9.263	10 22 43.0	+52.87	15 57.82	65.08	0 20.78	0.591	
Tues.	17	1 43 35.82	9.278	10 43 46.8	52.43	15 57.56	65.14	0 34.79	0.576	
Wed.	18	1 47 18.70	9.295	11 4 39.9	51.98	15 57.30	65.20	0 48.42	0.560	
Thur.	19	1 51 1.97	9.312	11 25 22.0	+51.51	15 57.05	65.26	1 1.67	0.543	
Frid.	20	1 54 45.65	9.329	11 45 52.7	51.03	15 56.80	65.33	1 14.52	0.526	
Sat.	21	1 58 29.74	9.347	12 6 11.8	50.54	15 56.55	65.39	1 26.95	0.508	
SUN.	22	2 2 14.26	9.365	12 26 19.0	+50.03	15 56.30	65.46	1 38.95	0.490	
Mon.	23	2 5 59.23	9.384	12 46 13.8	49.51	15 56.05	65.53	1 50.50	0.471	
Tues.	24	2 9 44.66	9.403	13 5 56.0	48.98	15 55.80	65.60	2 1.60	0.452	
Wed.	25	2 13 30.57	9.423	13 25 25.3	+48.44	15 55.55	65.67	2 12.22	0.432	
Thur.	26	2 17 16.97	9.444	13 44 41.3	47.88	15 55.30	65.74	2 22.34	0.411	
Frid.	27	2 21 3.87	9.465	14 3 43.8	47.32	15 55.05	65.81	2 31.96	0.390	
Sat.	28	2 24 51.29	9.487	14 22 32.4	+46.74	15 54.80	65.89	2 41.08	0.368	
SUN.	29	2 28 39.23	9.509	14 41 6.9	46.14	15 54.55	65.96	2 49.66	0.346	
Mon.	30	2 32 27.72	9.532	14 59 27.0	45.53	15 54.30	66.04	2 57.70	0.323	
Tues.	31	2 36 16.77	9.555	N.15 17 32.4	+44.91	15 54.06	66.11	3 5.19	0.300	

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.18 from the sidereal time.  
The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

## AT GREENWICH MEAN NOON.

Day of the Week	Day of the Month	THE SUN'S				Equation of Time, to be Subtracted from	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
SUN.	1	0 44 51.42	9.102	N. 4 49 21.8	+57.68	3 45.55	0.754	0 41 5.87
Mon.	2	0 48 29.94	9.108	5 12 23.7	57.46	3 27.52	0.748	0 45 2.42
Tues.	3	0 52 8.63	9.115	5 35 20.1	57.23	3 9.66	0.741	0 48 58.97
Wed.	4	0 55 47.48	9.123	5 58 10.7	+56.98	2 51.95	0.733	0 52 55.53
Thur.	5	0 59 26.53	9.132	6 20 55.2	56.72	2 34.45	0.724	0 56 52.08
Frid.	6	1 3 5.80	9.141	6 43 33.4	56.45	2 17.17	0.715	1 0 48.63
Sat.	7	1 6 45.29	9.151	7 6 4.8	+56.16	2 0.11	0.705	1 4 45.18
SUN.	8	1 10 25.02	9.161	7 28 29.0	55.85	1 43.28	0.695	1 8 41.74
Mon.	9	1 14 5.02	9.172	7 50 45.7	55.53	1 26.73	0.684	1 12 38.29
Tues.	10	1 17 45.30	9.184	8 12 54.6	+55.20	1 10.46	0.672	1 16 34.84
Wed.	11	1 21 25.86	9.196	8 34 55.3	54.85	0 54.47	0.670	1 20 31.39
Thur.	12	1 25 6.72	9.209	8 56 47.5	54.48	0 38.77	0.647	1 24 27.95
Frid.	13	1 28 47.89	9.222	9 18 30.7	+54.10	0 23.38	0.634	1 28 24.50
Sat.	14	1 32 29.38	9.236	9 40 4.6	53.71	0 8.32	0.620	1 32 21.06
SUN.	15	1 36 11.21	9.250	10 1 28.9	53.30	0 6.40	0.606	1 36 17.61
Mon.	16	1 39 53.38	9.265	10 22 43.3	+52.88	0 20.78	0.591	1 40 14.16
Tues.	17	1 43 35.92	9.280	10 43 47.3	52.44	0 34.79	0.576	1 44 10.71
Wed.	18	1 47 18.84	9.296	11 4 40.6	51.99	0 48.43	0.560	1 48 7.27
Thur.	19	1 51 2.14	9.313	11 25 22.9	+51.52	1 1.68	0.543	1 52 3.82
Frid.	20	1 54 45.85	9.330	11 45 53.8	51.04	1 14.53	0.526	1 56 0.38
Sat.	21	1 58 29.97	9.348	12 6 13.1	50.55	1 26.96	0.508	1 59 56.93
SUN.	22	2 2 14.52	9.366	12 26 20.4	+50.04	1 38.96	0.490	2 3 53.48
Mon.	23	2 5 59.52	9.385	12 46 15.4	49.52	1 50.51	0.471	2 7 50.03
Tues.	24	2 9 44.98	9.404	13 5 57.7	48.99	2 1.61	0.452	2 11 46.59
Wed.	25	2 13 30.91	9.424	13 25 27.1	+48.45	2 12.23	0.432	2 15 43.14
Thur.	26	2 17 17.34	9.445	13 44 43.2	47.89	2 22.36	0.411	2 19 39.70
Frid.	27	2 21 4.27	9.466	14 3 45.8	47.32	2 31.98	0.390	2 23 36.25
Sat.	28	2 24 51.71	9.488	14 22 34.5	+46.74	2 41.10	0.368	2 27 32.81
SUN.	29	2 28 39.68	9.510	14 41 9.1	46.14	2 49.68	0.346	2 31 29.36
Mon.	30	2 32 28.19	9.533	14 59 29.2	45.53	2 57.72	0.323	2 35 25.91
Tues.	31	2 36 17.26	9.556	N. 15 17 34.6	+44.91	3 5.20	0.300	2 39 22.46

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

Diff. for 1 Hour,  
+ 9°.8565.  
(Table III.)

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.	
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	92	12° 12' 2.8"	12° 4.9"	147.77	+ 0.34	0.0000307	+53.2	<sup>h</sup> 23 <sup>m</sup> 15 <sup>s</sup> 4.96	
2	93	13 11 8.4	11 10.4	147.70	0.26	0.0001586	53.3	23 11 9.05	
3	94	14 10 12.2	10 14.1	147.63	0.14	0.0002865	53.3	23 7 13.14	
4	95	15 9 14.3	9 16.2	147.55	+ 0.01	0.0004143	+53.2	23 3 17.23	
5	96	16 8 14.7	8 16.5	147.48	— 0.12	0.0005418	53.0	22 59 21.33	
6	97	17 7 13.3	7 15.0	147.40	0.25	0.0006688	52.8	22 55 25.42	
7	98	18 6 10.1	6 11.7	147.33	— 0.38	0.0007953	+52.6	22 51 29.51	
8	99	19 5 5.1	5 6.6	147.25	0.50	0.0009211	52.3	22 47 33.60	
9	100	20 3 58.2	3 59.6	147.17	0.61	0.0010461	51.9	22 43 37.70	
10	101	21 2 49.4	2 50.7	147.09	— 0.69	0.0011702	+51.5	22 39 41.79	
11	102	22 1 38.8	1 40.0	147.01	0.73	0.0012932	51.1	22 35 45.88	
12	103	23 0 26.2	0 27.3	146.93	0.75	0.0014152	50.6	22 31 49.97	
13	104	23 59 11.5	59 12.5	146.84	— 0.74	0.0015361	+50.2	22 27 54.07	
14	105	24 57 54.6	57 55.5	146.75	0.70	0.0016560	49.8	22 23 58.16	
15	106	25 56 35.6	56 36.4	146.66	0.63	0.0017749	49.4	22 20 2.25	
16	107	26 55 14.4	55 15.1	146.57	— 0.53	0.0018927	+48.9	22 16 6.34	
17	108	27 53 50.9	53 51.5	146.48	0.42	0.0020096	48.5	22 12 10.44	
18	109	28 52 25.3	52 25.8	146.39	0.30	0.0021257	48.2	22 8 14.53	
19	110	29 50 57.5	50 57.9	146.30	— 0.17	0.0022412	+47.9	22 4 18.62	
20	111	30 49 27.6	49 27.9	146.21	— 0.04	0.0023560	47.7	22 0 22.72	
21	112	31 47 55.5	47 55.7	146.12	+ 0.08	0.0024702	47.5	21 56 26.82	
22	113	32 46 21.2	46 21.3	146.03	+ 0.19	0.0025839	+47.3	21 52 30.91	
23	114	33 44 44.9	44 44.8	145.94	0.27	0.0026973	47.2	21 48 35.00	
24	115	34 43 6.6	43 6.4	145.86	0.33	0.0028101	47.1	21 44 39.09	
25	116	35 41 26.4	41 26.1	145.78	+ 0.37	0.0029232	+47.0	21 40 43.19	
26	117	36 39 44.3	39 43.9	145.71	0.38	0.0030357	46.8	21 36 47.28	
27	118	37 38 0.4	37 59.9	145.64	0.35	0.0031479	46.7	21 32 51.37	
28	119	38 36 14.8	36 14.2	145.57	+ 0.29	0.0032597	+46.5	21 28 55.46	
29	120	39 34 27.6	34 26.9	145.50	0.21	0.0033710	46.3	21 24 59.55	
30	121	40 32 38.9	32 38.0	145.44	+ 0.10	0.0034816	46.0	21 21 3.64	
31	122	41 30 48.7	30 47.7	145.38	— 0.02	0.0035916	+45.7	21 17 7.73	
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>h</sup> 0 <sup>m</sup> 0 <sup>s</sup> .								Diff. for 1 Hour, — 9 <sup>m</sup> 8.296. (Table II.)	

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

## SEMIDIAMETER.

## HORIZONTAL PARALLAX.

## UPPER TRANSIT.

## AGE.

Noon.

Midnight.

Noon.

Diff. for  
1 Hour.

Midnight.

Diff. for  
1 Hour.Meridian of  
Greenwich.Diff. for  
1 Hour.

Noon.

	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
1	16' 14.5	16' 8.0	59' 29.9	-1.94	59' 6.0	-2.02	16 <sup>h</sup> 59.5 <sup>m</sup>	2.40	19.2
2	16' 1.3	15 54.6	58 41.4	2.06	58 16.6	2.06	17 56.5	2.34	20.2
3	15 47.9	15 41.4	57 52.0	2.03	57 28.0	1.96	18 51.7	2.25	21.2
4	15 35.1	15 29.2	57 5 0	-1.87	56 43.2	-1.77	19 44.4	2.13	22.2
5	15 23.5	15 18.3	56 22.5	1.67	56 3.2	1.55	20 34.2	2.02	23.2
6	15 13.4	15 8.9	55 45.3	1.43	55 28.9	1.31	21 21.3	1.91	24.2
7	15 4.8	15 1.1	55 13.9	-1.19	55 0.3	-1.08	22 6.2	1.83	25.2
8	14 57.8	14 54.8	54 48.1	0.96	54 37.2	0.85	22 49.4	1.77	26.2
9	14 52.3	14 50.0	54 27.7	0.74	54 19.4	0.64	23 31.6	1.74	27.2
10	14 48.1	14 46.5	54 12.3	-0.54	54 6.4	-0.44	0 <sup>h</sup>		28.2
11	14 45.2	14 44.3	54 1.8	0.33	53 58.5	-0.22	0 13.4	1.75	0.1
12	14 43.8	14 43.6	53 56.5	-0.11	53 55.9	+0.01	0 55.6	1.77	1.1
13	14 43.8	14 44.5	53 56.8	+0.14	53 59.2	+0.27	1 38.7	1.82	2.1
14	14 45.6	14 47.1	54 3.2	0.40	54 8.9	0.55	2 23.1	1.88	3.1
15	14 49.2	14 51.8	54 16.5	0.71	54 26.0	0.88	3 9.1	1.96	4.1
16	14 55.0	14 58.7	54 37.6	+1.05	54 51.2	+1.22	3 57.0	2.03	5.1
17	15 2.9	15 7.8	55 6.9	1.40	55 24.7	1.58	4 46.6	2.10	6.1
18	15 13.2	15 19.2	55 44.7	1.75	56 6.7	1.91	5 37.6	2.15	7.1
19	15 25.7	15 32.7	56 30.5	+2.06	56 56.1	+2.20	6 29.5	2.17	8.1
20	15 40.0	15 47.7	57 23.2	2.30	57 51.3	2.37	7 21.8	2.18	9.1
21	15 55.5	16 3.4	58 20.0	2.40	58 48.9	2.39	8 14.2	2.19	10.1
22	16 11.1	16 18.5	59 17.3	+2.32	59 44.6	+2.20	9 6.9	2.20	11.1
23	16 25.5	16 31.7	60 10.1	2.02	60 33.0	1.77	10 0.1	2.23	12.1
24	16 37.1	16 41.3	60 52.6	1.47	61 8.3	1.12	10 54.1	2.28	13.1
25	16 44.4	16 46.1	61 19.5	+0.73	61 25.8	+0.31	11 49.5	2.35	14.1
26	16 46.4	16 45.4	61 27.0	-0.11	61 23.1	-0.53	12 46.7	2.43	15.1
27	16 42.9	16 39.2	61 14.2	0.94	61 0.6	1.30	13 45.7	2.49	16.1
28	16 34.4	16 28.6	60 42.9	-1.62	60 21.7	-1.88	14 45.8	2.51	17.1
29	16 22.1	16 15.0	59 57.7	2.09	59 31.5	2.24	15 45.6	2.47	18.1
30	16 7.5	15 59.7	59 3.9	2.33	58 35.5	2.37	16 43.8	2.37	19.1
31	15 52.0	15 44.3	58 7.0	-2.36	57 38.9	-2.31	17 39.1	2.23	20.1



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 1.					TUESDAY 3.				
0	<sup>h</sup> 17 <sup>m</sup> 1 <sup>s</sup> 17.30	2.4821	S. 18° 47' 21.6"	5.566	0	<sup>h</sup> 18 <sup>m</sup> 59 <sup>s</sup> 5.84	2.4018	S. 20° 43' 20.7"	0.690
1	17 3 46.22	2.4819	18 52 51.7	5.437	1	19 1 29.85	2.3986	20 42 35.6	0.813
2	17 6 15.13	2.4817	18 58 14.0	5.307	2	19 3 53.67	2.3953	20 41 43.1	0.937
3	17 8 44.03	2.4815	19 3 28.5	5.177	3	19 6 17.29	2.3920	20 40 43.1	1.061
4	17 11 12.91	2.4811	19 8 35.2	5.047	4	19 8 40.71	2.3887	20 39 35.8	1.183
5	17 13 41.76	2.4807	19 13 34.1	4.916	5	19 11 3.93	2.3853	20 38 21.2	1.304
6	17 16 10.59	2.4802	19 18 25.1	4.784	6	19 13 26.94	2.3818	20 36 59.3	1.426
7	17 18 39.39	2.4797	19 23 8.2	4.653	7	19 15 49.75	2.3783	20 35 30.1	1.547
8	17 21 8.15	2.4791	19 27 43.5	4.522	8	19 18 12.34	2.3748	20 33 53.7	1.666
9	17 23 36.88	2.4785	19 32 10.9	4.391	9	19 20 34.72	2.3712	20 32 10.2	1.784
10	17 26 5.57	2.4777	19 36 30.4	4.259	10	19 22 56.88	2.3675	20 30 19.6	1.903
11	17 28 34.21	2.4769	19 40 42.0	4.127	11	19 25 18.82	2.3638	20 28 21.9	2.021
12	17 31 2.80	2.4761	19 44 45.6	3.994	12	19 27 40.54	2.3601	20 26 17.1	2.138
13	17 33 31.34	2.4753	19 48 41.3	3.862	13	19 30 2.04	2.3564	20 24 5.3	2.255
14	17 35 59.82	2.4742	19 52 29.1	3.730	14	19 32 23.31	2.3526	20 21 46.5	2.371
15	17 38 28.24	2.4731	19 56 8.9	3.597	15	19 34 44.35	2.3487	20 19 20.8	2.486
16	17 40 56.59	2.4720	19 59 40.8	3.465	16	19 37 5.16	2.3448	20 16 48.2	2.601
17	17 43 24.88	2.4709	20 3 4.7	3.332	17	19 39 25.73	2.3409	20 14 8.7	2.715
18	17 45 53.10	2.4697	20 6 20.7	3.200	18	19 41 46.07	2.3370	20 11 22.4	2.828
19	17 48 21.24	2.4683	20 9 28.7	3.067	19	19 44 6.17	2.3330	20 8 29.3	2.941
20	17 50 49.29	2.4668	20 12 28.8	2.935	20	19 46 26.03	2.3290	20 5 29.5	3.052
21	17 53 17.26	2.4654	20 15 20.9	2.802	21	19 48 45.65	2.3250	20 2 23.1	3.163
22	17 55 45.14	2.4639	20 18 5.0	2.669	22	19 51 5.03	2.3209	19 59 10.0	3.272
23	17 58 12.93	2.4623	S. 20° 20' 41.2"	2.537	23	19 53 24.16	2.3167	S. 19° 55' 50.4"	3.382
MONDAY 2.					WEDNESDAY 4.				
0	18 0 40.02	2.4607	S. 20° 23' 9.5"	2.406	0	19 55 43.04	2.3126	S. 19° 52' 24.2"	3.491
1	18 3 8.21	2.4589	20 25 29.9	2.273	1	19 58 1.67	2.3084	19 48 51.5	3.599
2	18 5 35.69	2.4571	20 27 42.3	2.141	2	20 0 20.05	2.3042	19 45 12.4	3.706
3	18 8 3.06	2.4552	20 29 46.8	2.009	3	20 2 38.18	2.3000	19 41 26.8	3.813
4	18 10 30.32	2.4534	20 31 43.4	1.877	4	20 4 56.05	2.2957	19 37 34.9	3.918
5	18 12 57.47	2.4515	20 33 32.1	1.746	5	20 7 13.67	2.2915	19 33 36.7	4.023
6	18 15 24.50	2.4494	20 35 12.9	1.615	6	20 9 31.03	2.2872	19 29 32.2	4.127
7	18 17 51.40	2.4472	20 36 45.9	1.484	7	20 11 48.13	2.2829	19 25 21.5	4.229
8	18 20 18.17	2.4450	20 38 11.0	1.353	8	20 14 4.97	2.2786	19 21 4.7	4.331
9	18 22 44.80	2.4427	20 39 28.2	1.222	9	20 16 21.56	2.2742	19 16 41.8	4.433
10	18 25 11.29	2.4404	20 40 37.6	1.092	10	20 18 37.88	2.2698	19 12 12.8	4.534
11	18 27 37.65	2.4381	20 41 39.3	0.963	11	20 20 53.94	2.2654	19 7 37.7	4.635
12	18 30 3.87	2.4357	20 42 33.2	0.833	12	20 23 9.73	2.2610	19 2 56.6	4.734
13	18 32 29.94	2.4332	20 43 19.3	0.704	13	20 25 25.26	2.2567	18 58 9.6	4.832
14	18 34 55.85	2.4306	20 43 57.7	0.575	14	20 27 40.53	2.2523	18 53 16.8	4.929
15	18 37 21.61	2.4280	20 44 28.3	0.446	15	20 29 55.53	2.2478	18 48 18.2	5.025
16	18 39 47.21	2.4253	20 44 51.2	0.318	16	20 32 10.26	2.2433	18 43 13.8	5.121
17	18 42 12.64	2.4225	20 45 6.5	0.191	17	20 34 24.73	2.2389	18 38 3.7	5.216
18	18 44 37.91	2.4197	20 45 14.1	-0.064	18	20 36 38.93	2.2344	18 32 47.9	5.310
19	18 47 3.01	2.4168	20 45 14.1	+0.063	19	20 38 52.86	2.2299	18 27 26.5	5.403
20	18 49 27.93	2.4139	20 45 6.5	0.190	20	20 41 6.52	2.2255	18 21 59.5	5.496
21	18 51 52.68	2.4110	20 44 51.3	0.316	21	20 43 19.92	2.2211	18 16 27.0	5.587
22	18 54 17.25	2.4080	20 44 28.6	0.441	22	20 45 33.05	2.2166	18 10 49.0	5.677
23	18 56 41.64	2.4049	20 43 58.4	0.566	23	20 47 45.91	2.2120	18 5 5.7	5.767
24	18 59 5.84	2.4018	S. 20° 43' 20.7"	0.690	24	20 49 58.49	2.2074	S. 17° 59' 17.0"	5.856

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 5.					SATURDAY 7.				
0	<sup>h</sup> 20 <sup>m</sup> 49 <sup>s</sup> 58.49	2.2074	S. 17° 50' 17.0	5.856	0	<sup>h</sup> 22 <sup>m</sup> 30 <sup>s</sup> 58.51	2.0087	S. 11° 52' 13.6	9.110
1	20 52 10.80	2.2030	17 53 23.0	5.943	1	22 32 58.93	2.0052	11 43 5.6	9.158
2	20 54 22.85	2.1986	17 47 23.8	6.030	2	22 34 59.14	2.0017	11 33 54.7	9.205
3	20 56 34.63	2.1941	17 41 19.4	6.117	3	22 36 59.14	1.9983	11 24 41.0	9.251
4	20 58 46.14	2.1896	17 35 9.8	6.203	4	22 38 58.91	1.9950	11 15 24.6	9.295
5	21 0 57.38	2.1852	17 28 55.0	6.288	5	22 40 58.54	1.9916	11 6 5.6	9.338
6	21 3 8.36	2.1807	17 22 35.2	6.372	6	22 42 57.93	1.9883	10 56 44.0	9.382
7	21 5 19.07	2.1762	17 16 10.4	6.454	7	22 44 57.13	1.9850	10 47 19.8	9.425
8	21 7 29.51	2.1717	17 9 40.7	6.536	8	22 46 56.13	1.9818	10 37 53.0	9.467
9	21 9 39.68	2.1673	17 3 6.1	6.617	9	22 48 54.94	1.9786	10 28 23.8	9.508
10	21 11 49.59	2.1629	16 56 26.7	6.697	10	22 50 53.56	1.9754	10 18 52.1	9.548
11	21 13 59.23	2.1584	16 49 42.5	6.777	11	22 52 51.99	1.9723	10 9 18.0	9.587
12	21 16 8.60	2.1540	16 42 53.5	6.855	12	22 54 50.23	1.9692	9 59 41.6	9.626
13	21 18 17.71	2.1496	16 35 59.8	6.932	13	22 56 48.29	1.9662	9 50 2.9	9.664
14	21 20 26.56	2.1452	16 29 1.6	7.008	14	22 58 46.17	1.9632	9 40 22.0	9.701
15	21 22 35.14	2.1408	16 21 58.8	7.084	15	23 0 43.87	1.9602	9 30 38.8	9.738
16	21 24 43.46	2.1365	16 14 51.5	7.160	16	23 2 41.39	1.9572	9 20 53.4	9.773
17	21 26 51.52	2.1321	16 7 39.6	7.235	17	23 4 38.73	1.9543	9 11 6.0	9.808
18	21 28 59.31	2.1278	16 0 23.3	7.308	18	23 6 35.90	1.9514	9 1 16.5	9.842
19	21 31 6.85	2.1235	15 53 2.7	7.380	19	23 8 32.90	1.9486	8 51 25.0	9.875
20	21 33 14.13	2.1192	15 45 37.7	7.452	20	23 10 29.74	1.9459	8 41 31.5	9.907
21	21 35 21.15	2.1149	15 38 8.5	7.522	21	23 12 26.41	1.9432	8 31 36.1	9.939
22	21 37 27.92	2.1107	15 30 35.1	7.592	22	23 14 22.92	1.9405	8 21 38.8	9.970
23	21 39 34.43	2.1064	S. 15° 22' 57.5	7.662	23	23 16 19.27	1.9378	S. 8° 11' 39.7	10.000
FRIDAY 6.					SUNDAY 8.				
0	21 41 40.68	2.1021	S. 15° 15' 15.7	7.730	0	23 18 15.46	1.9352	S. 8° 1' 38.8	10.030
1	21 43 46.68	2.0979	15 7 29.9	7.797	1	23 20 11.50	1.9326	7 51 36.1	10.059
2	21 45 52.43	2.0937	14 59 40.1	7.862	2	23 22 7.38	1.9301	7 41 31.7	10.087
3	21 47 57.93	2.0896	14 51 46.4	7.927	3	23 24 3.11	1.9277	7 31 25.7	10.114
4	21 50 3.18	2.0855	14 43 48.8	7.992	4	23 25 58.70	1.9252	7 21 18.1	10.140
5	21 52 8.19	2.0814	14 35 47.3	8.057	5	23 27 54.14	1.9228	7 11 8.9	10.167
6	21 54 12.95	2.0773	14 27 42.0	8.120	6	23 29 49.44	1.9205	7 0 58.1	10.193
7	21 56 17.47	2.0732	14 19 32.9	8.182	7	23 31 44.60	1.9182	6 50 45.8	10.217
8	21 58 21.74	2.0692	14 11 20.1	8.243	8	23 33 39.62	1.9159	6 40 32.1	10.240
9	22 0 25.77	2.0652	14 3 3.7	8.303	9	23 35 34.51	1.9137	6 30 17.0	10.262
10	22 2 29.56	2.0612	13 54 43.7	8.362	10	23 37 29.26	1.9115	6 20 0.6	10.284
11	22 4 33.12	2.0573	13 46 20.2	8.421	11	23 39 23.89	1.9094	6 9 42.9	10.306
12	22 6 36.44	2.0533	13 37 53.2	8.479	12	23 41 18.39	1.9073	5 59 23.9	10.327
13	22 8 39.52	2.0494	13 29 22.7	8.537	13	23 43 12.77	1.9052	5 49 3.7	10.347
14	22 10 42.37	2.0456	13 20 48.8	8.593	14	23 45 7.02	1.9032	5 38 42.3	10.367
15	22 12 44.99	2.0418	13 12 11.6	8.648	15	23 47 1.15	1.9012	5 28 19.7	10.386
16	22 14 47.38	2.0380	13 3 31.0	8.703	16	23 48 55.17	1.8993	5 17 56.0	10.403
17	22 16 49.55	2.0342	12 54 47.2	8.757	17	23 50 49.07	1.8974	5 7 31.3	10.420
18	22 18 51.49	2.0305	12 46 0.2	8.810	18	23 52 42.86	1.8956	4 57 5.6	10.437
19	22 20 53.21	2.0268	12 37 10.0	8.862	19	23 54 36.54	1.8938	4 46 38.9	10.452
20	22 22 54.71	2.0231	12 28 16.7	8.913	20	23 56 30.12	1.8921	4 36 11.3	10.467
21	22 24 55.98	2.0194	12 19 20.4	8.963	21	23 58 23.59	1.8904	4 25 42.8	10.482
22	22 26 57.04	2.0158	12 10 21.1	9.013	22	0 0 16.96	1.8886	4 15 13.4	10.496
23	22 28 57.88	2.0122	12 1 18.8	9.062	23	0 2 10.24	1.8872	4 4 43.3	10.509
24	22 30 58.51	2.0087	S. 11° 52' 13.6	9.110	24	0 4 3.42	1.8855	S. 3° 54' 12.4	10.521

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 9.					WEDNESDAY 11.				
0	<sup>h</sup> 0 <sup>m</sup> 4 <sup>s</sup> 3.42	1.8855	S. 3° 54' 12.4"	10.521	0	<sup>h</sup> 1 <sup>m</sup> 33 <sup>s</sup> 34.69	1.8809	N. 4° 32' 14.4"	10.329
1	0 5 56.50	1.8840	3 43 40.8	10.533	1	1 35 26.36	1.8814	4 42 33.6	10.309
2	0 7 49.50	1.8826	3 33 8.5	10.544	2	1 37 18.06	1.8819	4 52 51.5	10.288
3	0 9 42.41	1.8811	3 22 35.5	10.554	3	1 39 9.79	1.8825	5 3 8.1	10.266
4	0 11 35.23	1.8797	3 12 2.0	10.563	4	1 41 1.56	1.8832	5 13 23.4	10.244
5	0 13 27.97	1.8783	3 1 27.9	10.572	5	1 42 53.37	1.8838	5 23 37.4	10.222
6	0 15 20.63	1.8770	2 50 53.3	10.581	6	1 44 45.22	1.8845	5 33 50.1	10.200
7	0 17 13.21	1.8758	2 40 18.2	10.588	7	1 46 37.11	1.8853	5 44 1.4	10.176
8	0 19 5.72	1.8746	2 29 42.7	10.595	8	1 48 29.05	1.8861	5 54 11.2	10.151
9	0 20 58.16	1.8734	2 19 6.8	10.601	9	1 50 21.04	1.8869	6 4 19.5	10.126
10	0 22 50.53	1.8722	2 8 30.6	10.607	10	1 52 13.08	1.8878	6 14 26.3	10.100
11	0 24 42.83	1.8711	1 57 54.0	10.612	11	1 54 5.17	1.8887	6 24 31.5	10.074
12	0 26 35.06	1.8700	1 47 17.1	10.618	12	1 55 57.32	1.8896	6 34 35.2	10.048
13	0 28 27.23	1.8691	1 36 40.0	10.619	13	1 57 49.52	1.8705	6 44 37.3	10.021
14	0 30 19.35	1.8682	1 26 2.8	10.622	14	1 59 41.78	1.8716	6 54 37.7	9.992
15	0 32 11.41	1.8673	1 15 25.4	10.624	15	2 1 34.11	1.8727	7 4 36.3	9.963
16	0 34 3.42	1.8664	1 4 47.9	10.626	16	2 3 26.50	1.8737	7 14 33.2	9.933
17	0 35 55.38	1.8655	0 54 10.3	10.627	17	2 5 18.46	1.8748	7 24 28.3	9.903
18	0 37 47.28	1.8647	0 43 32.7	10.627	18	2 7 11.48	1.8759	7 34 21.6	9.873
19	0 39 39.14	1.8640	0 32 55.1	10.626	19	2 9 4.07	1.8772	7 44 13.1	9.842
20	0 41 30.96	1.8633	0 22 17.6	10.625	20	2 10 56.74	1.8785	7 54 2.6	9.809
21	0 43 22.74	1.8627	0 11 40.1	10.624	21	2 12 49.49	1.8797	8 3 50.2	9.776
22	0 45 14.48	1.8620	S. 0° 1' 2.7"	10.622	22	2 14 42.31	1.8810	8 13 35.8	9.743
23	0 47 6.18	1.8614	N. 0° 9' 34.5"	10.618	23	2 16 35.21	1.8823	N. 8° 23' 19.4"	9.710
TUESDAY 10.					THURSDAY 12.				
0	0 48 57.85	1.8609	N. 0° 20' 11.4"	10.613	0	2 18 28.19	1.8837	N. 8° 33' 1.0"	9.676
1	0 50 49.49	1.8604	0 30 48.1	10.609	1	2 20 21.25	1.8851	8 42 40.5	9.641
2	0 52 41.10	1.8600	0 41 24.5	10.604	2	2 22 14.40	1.8866	8 52 17.9	9.605
3	0 54 32.69	1.8596	0 52 0.6	10.599	3	2 24 7.64	1.8881	9 1 53.1	9.568
4	0 56 24.25	1.8593	1 2 36.4	10.592	4	2 26 0.97	1.8896	9 11 26.1	9.531
5	0 58 15.80	1.8590	1 13 11.7	10.585	5	2 27 54.39	1.8911	9 20 56.9	9.494
6	1 0 7.33	1.8587	1 23 46.6	10.577	6	2 29 47.90	1.8927	9 30 25.4	9.456
7	1 1 58.84	1.8584	1 34 21.0	10.569	7	2 31 41.51	1.8943	9 39 51.6	9.417
8	1 3 50.34	1.8582	1 44 54.9	10.560	8	2 33 35.22	1.8959	9 49 15.5	9.378
9	1 5 41.83	1.8581	1 55 28.2	10.550	9	2 35 29.02	1.8975	9 58 37.0	9.338
10	1 7 33.31	1.8580	2 6 0.9	10.540	10	2 37 22.92	1.8992	10 7 56.0	9.297
11	1 9 24.79	1.8580	2 16 33.0	10.529	11	2 39 16.93	1.9010	10 17 12.6	9.256
12	1 11 16.27	1.8580	2 27 4.4	10.517	12	2 41 11.04	1.9028	10 26 26.7	9.214
13	1 13 7.75	1.8580	2 37 35.1	10.505	13	2 43 5.26	1.9046	10 35 38.3	9.172
14	1 14 59.23	1.8580	2 48 5.0	10.492	14	2 44 59.59	1.9064	10 44 47.3	9.128
15	1 16 50.71	1.8581	2 58 34.1	10.478	15	2 46 54.03	1.9083	10 53 53.7	9.084
16	1 18 42.20	1.8582	3 9 2.4	10.464	16	2 48 48.58	1.9102	11 2 57.4	9.039
17	1 20 33.70	1.8584	3 19 29.8	10.450	17	2 50 43.25	1.9121	11 11 58.4	8.994
18	1 22 25.21	1.8587	3 29 56.4	10.435	18	2 52 38.03	1.9140	11 20 56.7	8.948
19	1 24 16.74	1.8590	3 40 22.0	10.419	19	2 54 32.93	1.9160	11 29 52.2	8.903
20	1 26 8.29	1.8593	3 50 46.6	10.402	20	2 56 27.95	1.9181	11 38 45.0	8.857
21	1 27 59.85	1.8596	4 1 10.2	10.384	21	2 58 23.10	1.9202	11 47 35.0	8.809
22	1 29 51.44	1.8600	4 11 32.7	10.366	22	3 0 18.37	1.9222	11 56 22.1	8.760
23	1 31 43.05	1.8604	4 21 54.1	10.348	23	3 2 13.76	1.9242	12 5 6.2	8.711
24	1 33 34.69	1.8609	N. 4° 32' 14.4"	10.329	24	3 4 9.27	1.9263	N. 12° 13' 47.4"	8.662

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 13.					SUNDAY 15.				
0	h m s	s	N. 12° 13' 47.4"	8.662	0	h m s	s	N. 18° 0' 55.9"	5.571
1	3 4 9.27	1.9283	12 22 25.6	8.612	1	4 39 28.20	2.0512	18 6 27.8	5.492
2	3 6 4.91	1.9284	12 31 0.8	8.561	2	4 41 31.36	2.0541	18 11 54.9	5.411
3	3 8 0.68	1.9306	12 39 32.9	8.509	3	4 43 34.69	2.0569	18 17 17.1	5.330
4	3 9 56.59	1.9329	12 48 1.9	8.458	4	4 45 38.19	2.0598	18 22 34.5	5.250
5	3 11 52.63	1.9351	12 56 27.8	8.406	5	4 47 41.86	2.0627	18 27 47.1	5.169
6	3 13 48.80	1.9373	13 4 50.6	8.352	6	4 49 45.71	2.0656	18 32 54.8	5.087
7	3 15 45.10	1.9395	13 13 10.1	8.298	7	4 51 49.73	2.0684	18 37 57.6	5.005
8	3 17 41.54	1.9418	13 21 26.4	8.244	8	4 53 53.92	2.0713	18 42 55.4	4.922
9	3 19 38.12	1.9442	13 29 39.4	8.189	9	4 55 58.28	2.0742	18 47 48.2	4.838
10	3 21 34.84	1.9465	13 37 49.1	8.133	10	4 58 2.82	2.0771	18 52 36.0	4.754
11	3 23 31.70	1.9489	13 45 55.4	8.077	11	5 0 7.53	2.0799	18 57 18.7	4.669
12	3 25 28.71	1.9513	13 53 58.4	8.021	12	5 2 12.41	2.0828	19 1 56.3	4.584
13	3 27 25.86	1.9537	14 1 57.9	7.963	13	5 4 17.47	2.0857	19 6 28.8	4.498
14	3 29 23.16	1.9562	14 9 53.9	7.904	14	5 6 22.70	2.0886	19 10 56.1	4.413
15	3 31 20.60	1.9586	14 17 46.4	7.846	15	5 8 28.10	2.0914	19 15 18.3	4.327
16	3 33 18.19	1.9611	14 25 35.4	7.787	16	5 10 33.67	2.0942	19 19 35.3	4.239
17	3 35 15.93	1.9636	14 33 20.9	7.728	17	5 12 39.40	2.0969	19 23 47.0	4.151
18	3 37 13.82	1.9661	14 41 2.8	7.667	18	5 14 45.30	2.0997	19 27 53.4	4.062
19	3 39 11.86	1.9686	14 48 41.0	7.606	19	5 16 51.37	2.1026	19 31 54.5	3.973
20	3 41 10.05	1.9712	14 56 15.5	7.544	20	5 18 57.61	2.1054	19 35 50.2	3.884
21	3 43 8.40	1.9737	15 3 46.2	7.481	21	5 21 4.02	2.1082	19 39 40.6	3.795
22	3 45 6.90	1.9763	15 11 13.2	7.418	22	5 23 10.60	2.1110	19 43 25.6	3.704
23	3 47 5.56	1.9790	N. 15 18 36.4	7.354	23	5 25 17.34	2.1138		
24	3 49 4.38	1.9816			24	5 27 24.25	2.1166	N. 19 47 5.1	3.613
SATURDAY 14.					MONDAY 16.				
0	h m s	s	N. 15 25 55.7	7.989	0	h m s	s	N. 19 50 39.1	3.521
1	3 51 3.35	1.9842	15 33 11.1	7.925	1	5 29 31.33	2.1193	19 54 7.6	3.439
2	3 53 2.48	1.9868	15 40 22.7	7.861	2	5 31 38.57	2.1220	19 57 30.6	3.357
3	3 55 1.77	1.9895	15 47 30.4	7.795	3	5 33 45.97	2.1247	20 0 48.1	3.275
4	3 57 1.22	1.9922	15 54 34.1	7.728	4	5 35 53.54	2.1275	20 4 0.0	3.192
5	3 59 0.84	1.9950	16 1 33.7	6.960	5	5 38 1.27	2.1302	20 7 6.3	3.058
6	4 1 0.62	1.9977	16 8 29.3	6.892	6	5 40 9.16	2.1329	20 10 6.9	2.963
7	4 3 0.56	2.0004	16 15 20.8	6.823	7	5 42 17.22	2.1356	20 13 1.9	2.868
8	4 5 0.67	2.0032	16 22 8.1	6.754	8	5 44 25.44	2.1382	20 15 51.1	2.773
9	4 7 0.94	2.0059	16 28 51.3	6.685	9	5 46 33.81	2.1408	20 18 34.6	2.677
10	4 9 1.38	2.0087	16 35 20.3	6.615	10	5 48 42.34	2.1435	20 21 12.3	2.580
11	4 11 1.98	2.0114	16 42 5.1	6.544	11	5 50 51.03	2.1461	20 23 44.2	2.484
12	4 13 2.75	2.0142	16 48 35.6	6.472	12	5 52 59.87	2.1486	20 26 10.4	2.387
13	4 15 3.69	2.0171	16 55 1.8	6.400	13	5 55 8.86	2.1512	20 28 30.7	2.289
14	4 17 4.80	2.0199	17 1 23.6	6.328	14	5 57 18.01	2.1538	20 30 45.1	2.191
15	4 19 6.08	2.0227	17 7 41.1	6.255	15	5 59 27.31	2.1563	20 32 53.7	2.093
16	4 21 7.53	2.0255	17 13 54.2	6.181	16	6 1 36.76	2.1588	20 34 56.3	1.994
17	4 23 9.14	2.0283	17 20 2.8	6.107	17	6 3 46.36	2.1613	20 36 53.0	1.896
18	4 25 10.92	2.0311	17 26 7.0	6.032	18	6 5 56.11	2.1638	20 38 43.8	1.797
19	4 27 12.87	2.0339	17 32 6.6	5.956	19	6 8 6.01	2.1663	20 40 28.6	1.696
20	4 29 14.99	2.0368	17 38 1.7	5.880	20	6 10 16.06	2.1687	20 42 7.3	1.595
21	4 31 17.29	2.0397	17 43 52.2	5.803	21	6 12 26.25	2.1710	20 43 40.0	1.494
22	4 33 19.76	2.0426	17 49 38.1	5.726	22	6 14 36.58	2.1733	20 45 6.6	1.393
23	4 35 22.40	2.0454	17 55 19.3	5.649	23	6 16 47.05	2.1757	20 46 27.1	1.292
24	4 37 25.21	2.0483			24	6 18 57.66	2.1780		
	4 39 28.20	2.0512	N. 18 0 55.9	5.571		6 21 8.41	2.1803	N. 20 47 41.6	1.190

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 17.					THURSDAY 19.				
0	6 <sup>h</sup> 21 <sup>m</sup> 8.41 <sup>s</sup>	2.1803	N. 20° 47' 41.6"	1.190	0	8 <sup>h</sup> 7 <sup>m</sup> 54.11 <sup>s</sup>	2.2565	N. 19° 41' 57.9"	3.397
1	6 23 19.30	2.1896	20 48 49.9	1.087	1	8 10 9.53	2.2574	19 37 54.7	4.108
2	6 25 30.32	2.1848	20 49 52.1	0.985	2	8 12 25.00	2.2582	19 33 44.9	4.218
3	6 27 41.48	2.1871	20 50 48.1	0.882	3	8 14 40.51	2.2589	19 29 28.5	4.329
4	6 29 52.77	2.1893	20 51 37.9	0.778	4	8 16 56.07	2.2597	19 25 5.4	4.440
5	6 32 4.19	2.1914	20 52 21.5	0.674	5	8 19 11.68	2.2605	19 20 35.7	4.550
6	6 34 15.74	2.1936	20 52 58.8	0.570	6	8 21 27.33	2.2612	19 15 59.4	4.660
7	6 36 27.42	2.1957	20 53 29.9	0.468	7	8 23 43.03	2.2620	19 11 16.5	4.770
8	6 38 39.22	2.1977	20 53 54.7	0.361	8	8 25 58.77	2.2627	19 6 27.0	4.881
9	6 40 51.15	2.1998	20 54 13.2	0.256	9	8 28 14.55	2.2633	19 1 30.8	4.991
10	6 43 3.20	2.2018	20 54 25.4	0.151	10	8 30 30.37	2.2639	18 56 28.1	5.100
11	6 45 15.37	2.2038	20 54 31.3	+0.046	11	8 32 46.22	2.2645	18 51 18.8	5.209
12	6 47 27.66	2.2058	20 54 30.9	-0.060	12	8 35 2.11	2.2651	18 46 3.0	5.318
13	6 49 40.07	2.2078	20 54 24.1	0.167	13	8 37 18.03	2.2656	18 40 40.6	5.427
14	6 51 52.59	2.2097	20 54 10.9	0.273	14	8 39 33.98	2.2662	18 35 11.7	5.537
15	6 54 5.23	2.2116	20 53 51.3	0.380	15	8 41 49.97	2.2667	18 29 36.2	5.646
16	6 56 17.98	2.2134	20 53 25.3	0.487	16	8 44 5.99	2.2672	18 23 54.2	5.754
17	6 58 30.84	2.2152	20 52 52.8	0.595	17	8 46 22.04	2.2677	18 18 5.7	5.863
18	7 0 43.80	2.2169	20 52 13.9	0.702	18	8 48 38.11	2.2681	18 12 10.7	5.971
19	7 2 56.87	2.2187	20 51 28.5	0.810	19	8 50 54.21	2.2685	18 6 9.2	6.078
20	7 5 10.05	2.2205	20 50 36.7	0.918	20	8 53 10.33	2.2689	18 0 1.3	6.186
21	7 7 23.33	2.2222	20 49 38.4	1.026	21	8 55 26.48	2.2693	17 53 46.9	6.293
22	7 9 36.72	2.2239	20 48 33.6	1.134	22	8 57 42.65	2.2698	17 47 26.1	6.400
23	7 11 50.20	2.2255	N. 20° 47' 22.3"	1.242	23	8 59 58.85	2.2702	N. 17° 40' 58.9"	6.507
WEDNESDAY 18.					FRIDAY 20.				
0	7 14 3.78	2.2272	N. 20° 46' 4.5"	1.351	0	9 2 15.07	2.2705	N. 17° 34' 25.2"	6.614
1	7 16 17.46	2.2288	20 44 40.2	1.460	1	9 4 31.31	2.2708	17 27 45.2	6.720
2	7 18 31.23	2.2303	20 43 9.3	1.570	2	9 6 47.57	2.2711	17 20 58.8	6.826
3	7 20 45.09	2.2318	20 41 31.8	1.680	3	9 9 3.84	2.2714	17 14 6.1	6.931
4	7 22 59.04	2.2333	20 39 47.7	1.789	4	9 11 20.13	2.2717	17 7 7.1	7.036
5	7 25 13.08	2.2347	20 37 57.1	1.898	5	9 13 36.44	2.2720	17 0 1.8	7.141
6	7 27 27.20	2.2361	20 35 59.9	2.003	6	9 15 52.77	2.2722	16 52 50.2	7.245
7	7 29 41.41	2.2375	20 33 56.1	2.118	7	9 18 9.11	2.2725	16 45 32.4	7.348
8	7 31 55.70	2.2389	20 31 45.7	2.228	8	9 20 25.47	2.2728	16 38 8.4	7.452
9	7 34 10.08	2.2402	20 29 28.7	2.338	9	9 22 41.85	2.2731	16 30 38.1	7.556
10	7 36 24.53	2.2415	20 27 5.1	2.448	10	9 24 58.24	2.2733	16 23 1.7	7.659
11	7 38 39.06	2.2427	20 24 34.9	2.559	11	9 27 14.64	2.2734	16 15 19.1	7.761
12	7 40 53.66	2.2439	20 21 58.0	2.670	12	9 29 31.05	2.2736	16 7 30.4	7.862
13	7 43 8.33	2.2452	20 19 14.5	2.780	13	9 31 47.47	2.2738	15 59 35.6	7.963
14	7 45 23.08	2.2464	20 16 21.4	2.891	14	9 34 3.91	2.2741	15 51 34.8	8.064
15	7 47 37.90	2.2476	20 13 27.6	3.002	15	9 36 20.36	2.2743	15 43 27.9	8.165
16	7 49 52.79	2.2487	20 10 24.2	3.112	16	9 38 36.82	2.2744	15 35 15.0	8.265
17	7 52 7.74	2.2497	20 7 14.2	3.222	17	9 40 53.29	2.2747	15 26 56.1	8.364
18	7 54 22.76	2.2508	20 3 57.5	3.333	18	9 43 9.78	2.2749	15 18 31.3	8.463
19	7 56 37.84	2.2518	20 0 34.2	3.444	19	9 45 26.28	2.2750	15 10 0.6	8.561
20	7 58 52.98	2.2528	19 57 4.2	3.555	20	9 47 42.78	2.2751	15 1 24.0	8.658
21	8 1 8.18	2.2538	19 53 27.6	3.666	21	9 49 59.29	2.2753	14 52 41.6	8.755
22	8 3 23.44	2.2547	19 49 44.3	3.777	22	9 52 15.81	2.2755	14 43 53.4	8.852
23	8 5 38.75	2.2556	19 45 54.4	3.887	23	9 54 32.35	2.2757	14 34 59.4	8.948
24	8 7 54.11	2.2565	N. 19° 41' 57.9"	3.997	24	9 56 48.90	2.2758	N. 14° 25' 59.6"	9.044

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 21.					MONDAY 23.				
0	<sup>h</sup> 9 <sup>m</sup> 56 <sup>s</sup> 48.90	2.2758	N. <sup>°</sup> 25 <sup>'</sup> 59.6	9.044	0	<sup>h</sup> 11 <sup>m</sup> 46 <sup>s</sup> 27.73	2.3000	N. <sup>°</sup> 5 <sup>'</sup> 37 <sup>"</sup> 1.0	12.630
1	9 59 5.45	2.2760	14 16 54.1	9.138	1	11 48 45.76	2.3011	5 24 21.7	12.678
2	10 1 22.02	2.2762	14 7 43.0	9.232	2	11 51 3.86	2.3022	5 11 39.6	12.725
3	10 3 38.60	2.2764	13 58 26.3	9.325	3	11 53 22.03	2.3034	4 58 54.7	12.771
4	10 5 55.19	2.2766	13 49 4.0	9.417	4	11 55 40.27	2.3046	4 46 7.1	12.816
5	10 8 11.79	2.2768	13 39 36.2	9.510	5	11 57 58.58	2.3058	4 33 16.8	12.859
6	10 10 28.41	2.2771	13 30 2.8	9.602	6	12 0 16.96	2.3070	4 20 24.0	12.901
7	10 12 45.04	2.2773	13 20 24.0	9.692	7	12 2 35.42	2.3083	4 7 28.7	12.942
8	10 15 1.68	2.2774	13 10 39.7	9.782	8	12 4 53.96	2.3096	3 54 31.0	12.980
9	10 17 18.33	2.2777	13 0 50.1	9.871	9	12 7 12.57	2.3109	3 41 31.1	13.017
10	10 19 35.00	2.2779	12 50 55.2	9.959	10	12 9 31.27	2.3122	3 28 29.0	13.053
11	10 21 51.68	2.2781	12 40 55.0	10.047	11	12 11 50.05	2.3137	3 15 24.7	13.089
12	10 24 8.37	2.2783	12 30 49.5	10.135	12	12 14 8.91	2.3151	3 2 18.3	13.122
13	10 26 25.68	2.2786	12 20 38.8	10.221	13	12 16 27.86	2.3166	2 49 10.0	13.154
14	10 28 41.81	2.2789	12 10 23.0	10.306	14	12 18 46.90	2.3182	2 35 59.8	13.184
15	10 30 58.55	2.2792	12 0 2.1	10.390	15	12 21 6.04	2.3197	2 22 47.9	13.212
16	10 33 15.31	2.2795	11 49 36.2	10.474	16	12 23 25.27	2.3213	2 9 34.3	13.240
17	10 35 32.09	2.2798	11 39 5.3	10.557	17	12 25 44.60	2.3230	1 56 19.1	13.267
18	10 37 48.89	2.2802	11 28 29.4	10.639	18	12 28 4.03	2.3247	1 43 2.3	13.292
19	10 40 5.71	2.2805	11 17 48.6	10.720	19	12 30 23.56	2.3263	1 29 44.1	13.314
20	10 42 22.55	2.2808	11 7 3.0	10.800	20	12 32 43.19	2.3280	1 16 24.6	13.335
21	10 44 39.41	2.2812	10 56 12.6	10.879	21	12 35 2.92	2.3298	1 3 3.9	13.355
22	10 46 56.30	2.2817	10 45 17.5	10.957	22	12 37 22.76	2.3316	0 49 42.0	13.373
23	10 49 13.21	2.2821	N. 10 34 17.7	11.035	23	12 39 42.71	2.3333	N. 0 36 19.1	13.390
SUNDAY 22.					TUESDAY 24.				
0	10 51 30.15	2.2825	N. 10 23 13.3	11.111	0	12 42 2.76	2.3352	N. 0 22 55.2	13.405
1	10 53 47.11	2.2829	10 12 4.4	11.187	1	12 44 22.93	2.3372	N. 0 9 30.5	13.418
2	10 56 4.10	2.2834	10 0 50.9	11.263	2	12 46 43.22	2.3391	S. 0 3 55.0	13.431
3	10 58 21.12	2.2839	9 49 32.9	11.337	3	12 49 3.62	2.3410	0 17 21.2	13.442
4	11 0 38.17	2.2844	9 38 10.5	11.409	4	12 51 24.14	2.3430	0 30 48.0	13.450
5	11 2 55.25	2.2849	9 26 43.8	11.480	5	12 53 44.78	2.3451	0 44 15.2	13.457
6	11 5 12.36	2.2855	9 15 12.9	11.550	6	12 56 5.55	2.3472	0 57 42.8	13.462
7	11 7 29.51	2.2861	9 3 37.8	11.620	7	12 58 26.44	2.3493	1 11 10.7	13.466
8	11 9 46.69	2.2867	8 51 58.5	11.689	8	13 0 47.46	2.3514	1 24 38.7	13.467
9	11 12 3.91	2.2873	8 40 15.1	11.757	9	13 3 8.61	2.3536	1 38 6.8	13.468
10	11 14 21.17	2.2880	8 28 27.7	11.823	10	13 5 29.89	2.3557	1 51 34.9	13.467
11	11 16 38.47	2.2887	8 16 36.4	11.888	11	13 7 51.30	2.3580	2 5 2.9	13.464
12	11 18 55.81	2.2894	8 4 41.2	11.952	12	13 10 12.85	2.3603	2 18 30.6	13.459
13	11 21 13.19	2.2901	7 52 42.2	12.015	13	13 12 34.54	2.3626	2 31 58.0	13.453
14	11 23 30.62	2.2906	7 40 39.4	12.077	14	13 14 56.36	2.3649	2 45 25.0	13.445
15	11 25 48.09	2.2916	7 28 32.9	12.138	15	13 17 18.32	2.3673	2 58 51.4	13.435
16	11 28 5.61	2.2924	7 16 22.8	12.197	16	13 19 40.43	2.3697	3 12 17.2	13.424
17	11 30 23.18	2.2933	7 4 9.2	12.255	17	13 22 2.68	2.3720	3 25 42.3	13.411
18	11 32 40.81	2.2942	6 51 52.2	12.312	18	13 24 25.07	2.3744	3 39 6.5	13.396
19	11 34 58.49	2.2951	6 39 31.8	12.368	19	13 26 47.61	2.3769	3 52 29.8	13.379
20	11 37 16.22	2.2960	6 27 8.0	12.424	20	13 29 10.30	2.3795	4 5 52.0	13.361
21	11 39 34.01	2.2969	6 14 40.9	12.478	21	13 31 33.15	2.3821	4 19 13.1	13.341
22	11 41 51.85	2.2979	6 2 10.6	12.530	22	13 33 56.15	2.3846	4 32 32.9	13.318
23	11 44 9.76	2.2990	5 49 37.3	12.580	23	13 36 19.30	2.3871	4 45 51.3	13.295
24	11 46 27.73	2.3000	N. 5 37 1.0	12.630	24	13 38 42.60	2.3897	S. 4 59 8.3	13.270

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 25.					FRIDAY 27.				
0	13 38 42.60	2.3897	S. 4 59 8.3	13.370	0	15 36 38.63	2.5229	S. 14 33 26.7	10.010
1	13 41 6.06	2.3923	5 12 23.7	13.242	1	15 39 10.08	2.5253	14 43 24.1	9.903
2	13 43 23.46	2.3950	5 25 37.4	13.213	2	15 41 41.67	2.5277	14 53 15.1	9.795
3	13 45 53.68	2.3977	5 38 49.3	13.182	3	15 44 13.40	2.5300	15 2 59.5	9.685
4	13 48 17.40	2.4004	5 51 59.3	13.150	4	15 46 45.27	2.5322	15 12 37.3	9.574
5	13 50 41.50	2.4031	6 5 7.3	13.116	5	15 49 17.27	2.5345	15 22 8.4	9.462
6	13 53 5.77	2.4058	6 18 13.2	13.080	6	15 51 49.41	2.5367	15 31 32.8	9.349
7	13 55 30.20	2.4086	6 31 16.9	13.042	7	15 54 21.68	2.5388	15 40 50.3	9.233
8	13 57 54.80	2.4113	6 44 18.3	13.002	8	15 56 54.07	2.5408	15 50 0.8	9.117
9	14 0 19.56	2.4141	6 57 17.2	12.961	9	15 59 26.58	2.5428	15 59 4.3	8.999
10	14 2 44.49	2.4169	7 10 13.6	12.917	10	16 1 59.21	2.5448	16 8 0.7	8.881
11	14 5 9.59	2.4197	7 23 7.3	12.872	11	16 4 31.96	2.5467	16 16 50.0	8.761
12	14 7 34.85	2.4225	7 35 58.3	12.826	12	16 7 4.82	2.5486	16 25 32.0	8.639
13	14 10 0.29	2.4254	7 48 46.4	12.777	13	16 9 37.79	2.5504	16 34 6.7	8.517
14	14 12 25.90	2.4282	8 1 31.6	12.727	14	16 12 10.86	2.5521	16 42 34.1	8.395
15	14 14 51.68	2.4311	8 14 13.7	12.675	15	16 14 44.04	2.5537	16 50 54.1	8.271
16	14 17 17.63	2.4340	8 26 52.6	12.622	16	16 17 17.31	2.5553	16 59 6.6	8.146
17	14 19 43.76	2.4369	8 39 28.3	12.567	17	16 19 50.68	2.5569	17 7 11.6	8.019
18	14 22 10.06	2.4398	8 52 0.6	12.509	18	16 22 24.14	2.5584	17 15 8.9	7.891
19	14 24 36.53	2.4427	9 4 29.4	12.450	19	16 24 57.68	2.5597	17 22 58.5	7.763
20	14 27 3.18	2.4456	9 16 54.6	12.389	20	16 27 31.31	2.5610	17 30 40.5	7.635
21	14 29 30.00	2.4485	9 29 16.1	12.326	21	16 30 5.01	2.5622	17 38 14.7	7.504
22	14 31 57.00	2.4514	9 41 33.7	12.261	22	16 32 38.78	2.5634	17 45 41.0	7.373
23	14 34 24.17	2.4543	S. 9 53 47.4	12.195	23	16 35 12.62	2.5646	S. 17 52 59.4	7.241
THURSDAY 26.					SATURDAY 28.				
0	14 36 51.51	2.4572	S. 10 5 57.1	12.127	0	16 37 46.53	2.5657	S. 18 0 9.9	7.108
1	14 39 19.03	2.4601	10 18 2.7	12.058	1	16 40 20.50	2.5666	18 7 12.4	6.975
2	14 41 46.72	2.4630	10 30 4.1	11.987	2	16 42 54.52	2.5674	18 14 6.9	6.841
3	14 44 14.59	2.4659	10 42 1.2	11.914	3	16 45 28.59	2.5682	18 20 53.3	6.706
4	14 46 42.63	2.4688	10 53 53.8	11.839	4	16 48 2.71	2.5690	18 27 31.6	6.570
5	14 49 10.84	2.4717	11 5 41.9	11.763	5	16 50 36.87	2.5698	18 34 1.7	6.434
6	14 51 39.23	2.4746	11 17 25.4	11.686	6	16 53 11.06	2.5701	18 40 23.7	6.297
7	14 54 7.79	2.4774	11 29 4.2	11.607	7	16 55 45.28	2.5706	18 46 37.4	6.159
8	14 56 36.52	2.4803	11 40 38.2	11.525	8	16 58 19.53	2.5710	18 52 42.8	6.021
9	14 59 5.43	2.4831	11 52 7.2	11.442	9	17 0 53.80	2.5712	18 58 39.9	5.882
10	15 1 34.50	2.4859	12 3 31.2	11.357	10	17 3 28.08	2.5714	19 4 28.7	5.743
11	15 4 3.74	2.4887	12 14 50.1	11.271	11	17 6 2.37	2.5716	19 10 9.1	5.603
12	15 6 33.15	2.4915	12 26 3.7	11.183	12	17 8 36.67	2.5716	19 15 41.1	5.463
13	15 9 2.72	2.4943	12 37 12.0	11.093	13	17 11 10.96	2.5715	19 21 4.7	5.322
14	15 11 32.46	2.4971	12 48 14.9	11.003	14	17 13 45.25	2.5714	19 26 19.8	5.181
15	15 14 2.37	2.4998	12 59 12.3	10.911	15	17 16 19.53	2.5712	19 31 26.4	5.039
16	15 16 32.44	2.5025	13 10 4.2	10.817	16	17 18 53.79	2.5708	19 36 24.5	4.897
17	15 19 2.67	2.5052	13 20 50.4	10.722	17	17 21 28.03	2.5704	19 41 14.1	4.755
18	15 21 33.06	2.5078	13 31 30.8	10.624	18	17 24 2.24	2.5698	19 45 55.1	4.619
19	15 24 3.61	2.5104	13 42 5.3	10.526	19	17 26 36.41	2.5692	19 50 27.6	4.470
20	15 26 34.31	2.5129	13 52 33.9	10.426	20	17 29 10.55	2.5686	19 54 51.5	4.327
21	15 29 5.16	2.5155	14 2 56.4	10.324	21	17 31 44.64	2.5678	19 59 6.8	4.183
22	15 31 36.17	2.5181	14 13 12.8	10.221	22	17 34 18.68	2.5668	20 3 13.5	4.040
23	15 34 7.33	2.5205	14 23 22.9	10.116	23	17 36 52.66	2.5658	20 7 11.6	3.897
24	15 36 38.63	2.5229	S. 14 33 26.7	10.010	24	17 39 26.58	2.5648	S. 20 11 1.1	3.753

GREENWICH MEAN TIME.

### THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 29.					TUESDAY, MAY 1.				
0	<sup>h</sup> <sup>m</sup> <sup>s</sup> 17 39 26.58	<sup>s</sup> 2.5648	S. <sup>20</sup> <sup>11</sup> <sup>11</sup>	<sup>"</sup> 3.753	0	<sup>h</sup> <sup>m</sup> <sup>s</sup> 19 39 36.59	<sup>s</sup> 2.4119	S. <sup>20</sup> <sup>29</sup> <sup>35.7</sup>	<sup>"</sup> 2.788
1	17 42 0.44	2.5637	20 14 42.0	3.809					
2	17 44 34.22	2.5623	20 18 14.2	3.465					
3	17 47 7.92	2.5609	20 21 37.8	3.321					
4	17 49 41.53	2.5595	20 24 52.7	3.177					
5	17 52 15.06	2.5580	20 27 59.0	3.033					
6	17 54 48.49	2.5563	20 30 56.7	2.890					
7	17 57 21.82	2.5546	20 33 45.8	2.746					
8	17 59 55.04	2.5527	20 36 26.2	2.609					
9	18 2 28.15	2.5508	20 38 58.0	2.458					
10	18 5 1.14	2.5488	20 41 21.2	2.315					
11	18 7 34.01	2.5467	20 43 35.8	2.179					
12	18 10 6.75	2.5445	20 45 41.9	2.030					
13	18 12 39.35	2.5422	20 47 39.4	1.887					
14	18 15 11.82	2.5399	20 49 28.3	1.744					
15	18 17 44.14	2.5373	20 51 8.6	1.601					
16	18 20 16.30	2.5347	20 52 40.4	1.459					
17	18 22 48.31	2.5321	20 54 3.7	1.318					
18	18 25 20.16	2.5294	20 55 18.6	1.177					
19	18 27 51.84	2.5266	20 56 25.0	1.036					
20	18 30 23.35	2.5237	20 57 22.9	0.895					
21	18 32 54.68	2.5207	20 58 12.4	0.755					
22	18 35 25.83	2.5176	20 58 53.5	0.616					
23	18 37 56.79	2.5144	S. 20 59 26.3	0.477					
MONDAY 30.					PHASES OF THE MOON.				
0	18 40 27.55	2.5111	S. 20 59 50.8	0.339	☾ Last Quarter. . . April 3 0 41.2				
1	18 42 58.12	2.5078	21 0 7.0	0.201	● New Moon . . . . 10 21 7.7				
2	18 45 28.49	2.5044	21 0 14.9	-0.063	☾ First Quarter . . . 18 23 52.4				
3	18 47 58.65	2.5009	21 0 14.5	+0.075	○ Full Moon . . . . 25 18 22.2				
4	18 50 28.60	2.4973	21 0 5.9	0.911					
5	18 52 58.33	2.4937	20 59 49.2	0.346					
6	18 55 27.84	2.4900	20 59 24.4	0.481					
7	18 57 57.13	2.4863	20 58 51.5	0.616					
8	19 0 26.18	2.4823	20 58 10.5	0.750					
9	19 2 55.00	2.4783	20 57 21.5	0.883	☾ Apogee. . . . April 12 11.0				
10	19 5 23.58	2.4743	20 56 24.5	1.016	☾ Perigee. . . . . 25 20.8				
11	19 7 51.92	2.4703	20 55 19.6	1.147					
12	19 10 20.02	2.4662	20 54 6.9	1.277					
13	19 12 47.87	2.4620	20 52 46.4	1.406					
14	19 15 15.46	2.4577	20 51 18.0	1.536					
15	19 17 42.79	2.4533	20 49 41.8	1.667					
16	19 20 9.86	2.4489	20 47 57.9	1.796					
17	19 22 36.66	2.4445	20 46 6.4	1.929					
18	19 25 3.20	2.4400	20 44 7.3	2.048					
19	19 27 29.46	2.4354	20 42 0.6	2.174					
20	19 29 55.45	2.4308	20 39 46.4	2.298					
21	19 32 21.16	2.4261	20 37 24.8	2.422					
22	19 34 46.59	2.4214	20 34 55.8	2.545					
23	19 37 11.73	2.4167	20 32 19.4	2.667					
24	19 39 36.59	2.4119	S. 20 29 35.7	2.788					



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>b</sup> .	P. L. of Diff.	VI <sup>b</sup> .	P. L. of Diff.	IX <sup>b</sup> .	P. L. of Diff.
1	Spica W.	54° 6' 14"	2312	55° 51' 56"	2326	57° 37' 18"	2339	59° 22' 21"	2353
	Mars W.	50 42 21	2170	52 31 33	2185	54 20 23	2200	56 8 51	2214
	α Aquilæ E.	48 49 8	3417	47 27 11	3501	46 6 48	3593	44 48 6	3683
	Fomalhaut E.	78 37 24	2517	76 56 35	2536	75 16 12	2556	73 36 16	2576
	Venus E.	89 41 10	2657	88 3 32	2679	86 26 15	2699	84 49 21	2707
	α Pegasi E.	94 10 7	2623	92 31 43	2638	90 53 39	2659	89 15 55	2668
	Sun E.	116 2 30	2593	114 23 25	2609	112 44 42	2625	111 6 21	2641
2	Spica W.	68 2 29	2425	69 45 28	2440	71 28 6	2455	73 10 22	2470
	Mars W.	65 5 46	2288	66 52 3	2303	68 37 58	2318	70 23 32	2333
	Jupiter W.	24 4 5	2423	25 47 7	2433	27 29 55	2443	29 12 28	2455
	Antares W.	23 13 31	2728	24 49 34	2701	26 26 12	2684	28 3 14	2671
	Fomalhaut E.	65 23 50	2688	63 46 54	2713	62 10 31	2738	60 34 41	2764
	Venus E.	76 50 32	2722	75 15 54	2810	73 41 39	2828	72 7 47	2845
	α Pegasi E.	81 12 49	2756	79 37 24	2777	78 2 26	2798	76 27 55	2818
	Sun E.	103 0 8	2724	101 24 0	2741	99 48 14	2758	98 12 51	2775
3	Spica W.	81 36 28	2545	83 16 39	2560	84 56 29	2574	86 35 59	2590
	Mars W.	79 5 57	2406	80 49 23	2421	82 32 28	2435	84 15 13	2448
	Jupiter W.	37 40 49	2521	39 21 33	2535	41 1 59	2548	42 42 6	2561
	Antares W.	36 10 50	2661	37 48 22	2665	39 25 49	2671	41 3 8	2678
	Fomalhaut E.	52 44 43	2915	51 12 43	2950	49 41 27	2968	48 10 57	3004
	Venus E.	64 23 57	2930	62 52 16	2946	61 20 56	2963	59 49 57	2980
	α Pegasi E.	68 42 26	2935	67 10 51	2961	65 39 49	2987	64 9 20	3014
	Sun E.	90 21 28	2958	88 48 10	2974	87 15 18	2990	85 42 46	3006
4	Jupiter W.	50 58 5	2928	52 36 22	2940	54 14 22	2954	55 52 4	2968
	Antares W.	49 7 14	2719	50 43 28	2729	52 19 30	2738	53 55 19	2748
	Fomalhaut E.	40 51 20	3261	39 26 23	3290	38 2 35	3285	36 40 1	3456
	Venus E.	52 20 6	3060	50 51 7	3075	49 22 27	3089	47 54 4	3104
	α Pegasi E.	56 45 52	3170	55 19 7	3205	53 53 4	3249	52 27 45	3262
	Sun E.	78 5 10	2994	76 34 37	2999	75 4 23	3014	73 34 28	3028
5	Jupiter W.	63 56 29	2726	65 32 35	2738	67 8 25	2749	68 44 0	2760
	Antares W.	61 51 8	2728	63 25 38	2808	64 59 55	2818	66 33 59	2828
	Venus E.	40 36 36	3176	39 9 58	3189	37 43 36	3203	36 17 30	3216
	α Pegasi E.	45 33 35	3520	44 13 33	3579	42 54 36	3643	41 36 48	3711
	Sun E.	66 9 14	3097	64 41 1	3111	63 13 5	3124	61 45 25	3137
6	Jupiter W.	76 38 28	2811	78 12 42	2821	79 46 43	2830	81 20 32	2839
	Antares W.	74 21 15	2878	75 54 5	2884	77 26 44	2893	78 59 12	2902
	Venus E.	29 10 50	3280	27 46 15	3292	26 21 54	3304	24 57 47	3317
	Sun E.	54 30 51	3198	53 4 40	3209	51 38 42	3221	50 12 58	3232
7	Jupiter W.	89 6 46	2882	90 39 28	2890	92 12 0	2897	93 44 23	2904
	Antares W.	86 38 46	2943	88 10 10	2952	89 41 23	2960	91 12 26	2967
	α Aquilæ W.	45 58 8	4128	47 7 43	4074	48 18 10	4087	49 29 23	3083
	Sun E.	43 7 34	3988	41 43 8	3998	40 18 54	3308	38 54 52	3319
8	Antares W.	98 45 23	3004	100 15 31	3010	101 45 31	3017	103 15 23	3024
	α Aquilæ W.	55 34 54	3994	56 49 31	3990	58 4 33	3779	59 19 57	3761
	Sun E.	31 57 51	3374	30 35 5	3385	29 12 33	3400	27 50 16	3413

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
1	Spica W.	61° 7' 4"	2367	62° 51' 26"	2381	64° 35' 28"	2396	66° 19' 9"	2410
	Mars W.	57 56 58	2229	59 44 43	2243	61 32 6	2258	63 19 7	2273
	α Aquilæ E.	43 31 11	3802	42 16 11	3923	41 3 15	4056	39 52 31	4203
	Fomalhaut E.	71 56 48	2696	70 17 48	2618	68 39 18	2640	67 1 18	2664
	Venus E.	83 12 50	2724	81 36 42	2741	80 0 56	2758	78 25 33	2775
	α Pegasi E.	87 38 32	2684	86 1 31	2701	84 24 53	2719	82 48 39	2738
	Sun E.	109 28 22	2657	107 50 45	2674	106 13 30	2691	104 36 38	2707
2	Spica W.	74 52 17	2485	76 33 51	2500	78 15 4	2515	79 55 56	2530
	Mars W.	72 8 44	2247	73 53 35	2262	75 38 4	2277	77 22 11	2292
	Jupiter W.	30 54 45	2467	32 36 44	2481	34 18 24	2494	35 59 46	2507
	Antares W.	29 40 33	2663	31 18 2	2659	32 55 37	2657	34 33 14	2658
	Fomalhaut E.	58 59 26	2792	57 24 48	2821	55 50 47	2851	54 17 25	2882
	Venus E.	70 34 17	2862	69 1 9	2879	67 28 23	2896	65 55 59	2913
	α Pegasi E.	74 53 51	2841	73 20 16	2863	71 47 10	2886	70 14 33	2909
	Sun E.	96 37 50	2792	95 3 11	2808	93 28 53	2825	91 54 57	2842
3	Spica W.	88 15 8	2604	89 53 57	2618	91 32 27	2632	93 10 38	2646
	Mars W.	85 57 39	2463	87 39 45	2477	89 21 31	2490	91 2 58	2504
	Jupiter W.	44 21 55	2574	46 1 25	2588	47 40 37	2601	49 19 30	2615
	Antares W.	42 40 18	2685	44 17 18	2692	45 54 8	2701	47 30 47	2710
	Fomalhaut E.	46 41 14	3065	45 12 22	3110	43 44 24	3156	42 17 22	3206
	Venus E.	58 19 19	2996	56 49 1	3019	55 19 3	3028	53 49 25	3043
	α Pegasi E.	62 39 25	3043	61 10 6	3073	59 41 23	3104	58 13 18	3136
	Sun E.	84 10 35	2922	82 38 44	2938	81 7 13	2954	79 36 2	2969
4	Jupiter W.	57 29 30	2678	59 6 39	2691	60 43 31	2709	62 20 8	2714
	Antares W.	55 30 55	2758	57 6 18	2768	58 41 28	2778	60 16 25	2788
	Fomalhaut E.	35 18 48	3535	33 59 3	3523	32 40 54	3522	31 24 30	3523
	Venus E.	46 25 59	3119	44 58 12	3133	43 30 43	3148	42 3 31	3162
	α Pegasi E.	51 3 13	3324	49 39 29	3368	48 16 36	3415	46 54 37	3466
	Sun E.	72 4 50	3043	70 35 30	3057	69 6 28	3071	67 37 43	3084
5	Jupiter W.	70 19 21	2770	71 54 28	2781	73 29 21	2791	75 4 1	2801
	Antares W.	68 7 51	2837	69 41 31	2847	71 14 58	2856	72 48 13	2866
	Venus E.	34 51 40	3229	33 26 5	3242	32 0 45	3254	30 35 40	3267
	α Pegasi E.	40 20 13	3787	39 4 57	3869	37 51 6	3959	36 38 46	4060
	Sun E.	60 18 0	3149	58 50 50	3163	57 23 56	3174	55 57 16	3187
6	Jupiter W.	82 54 9	2948	84 27 35	2957	86 0 49	2965	87 33 53	2973
	Antares W.	80 31 28	2911	82 3 33	2919	83 35 28	2927	85 7 12	2935
	Venus E.	23 33 55	3329	22 10 17	3342	20 46 54	3355	19 23 46	3370
	Sun E.	48 47 27	3243	47 22 9	3255	45 57 5	3265	44 32 13	3276
7	Jupiter W.	95 16 37	2912	96 48 41	2919	98 20 36	2926	99 52 22	2933
	Antares W.	92 43 20	2974	94 14 5	2982	95 44 40	2989	97 15 6	2997
	α Aquilæ W.	50 41 19	3944	51 53 54	3911	53 7 3	3879	54 20 44	3851
	Sun E.	37 31 3	3330	36 7 26	3341	34 44 2	3351	33 20 50	3363
8	Antares W.	104 45 6	3030	106 14 41	3037	107 44 8	3043	109 13 27	3050
	α Aquilæ W.	60 35 40	3744	61 51 41	3737	63 7 59	3712	64 24 33	3700
	Sun E.	26 28 14	3427	25 6 28	3442	23 44 59	3458	22 23 48	3478

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III <sup>b</sup> .	P. L. of Diff.	VI <sup>b</sup> .	P. L. of Diff.	IX <sup>b</sup> .	P. L. of Diff.
12	SUN	W.	13 11 23	3743	14 27 25	3693	15 44 19	3657	17 1 52	3699
	POLLUX	E.	77 11 25	3118	75 43 37	3119	74 15 51	3191	72 48 7	3193
	SATURN	E.	84 34 59	3089	83 6 27	3084	81 37 58	3066	80 9 31	3067
13	SUN	W.	23 35 31	3549	24 55 1	3540	26 14 41	3531	27 34 31	3593
	POLLUX	E.	65 29 51	3199	64 2 16	3199	62 34 42	3199	61 7 8	3130
	SATURN	E.	72 47 25	3087	71 19 0	3087	69 50 35	3087	68 22 0	3066
	REGULUS	E.	101 11 21	3078	99 42 45	3078	98 14 9	3078	96 45 33	3076
14	SUN	W.	34 15 38	3491	35 36 12	3486	36 56 52	3480	38 17 38	3474
	POLLUX	E.	53 49 28	3139	52 21 57	3133	50 54 27	3139	49 26 56	3133
	SATURN	E.	60 59 37	3078	59 31 1	3076	58 2 22	3073	56 33 39	3069
	REGULUS	E.	89 22 7	3069	87 53 19	3066	86 24 28	3063	84 55 33	3060
15	SUN	W.	45 3 10	3443	46 24 38	3437	47 46 13	3431	49 7 55	3493
	POLLUX	E.	42 9 27	3134	40 41 59	3135	39 14 32	3137	37 47 7	3139
	SATURN	E.	49 9 3	3051	47 39 53	3046	46 10 37	3041	44 41 15	3036
	REGULUS	E.	77 29 58	3041	76 0 36	3036	74 31 8	3030	73 1 33	3025
16	SUN	W.	55 58 36	3383	57 21 12	3374	58 43 58	3365	60 6 55	3354
	SATURN	E.	37 12 38	3004	35 42 30	2997	34 12 13	2999	32 41 46	2991
	REGULUS	E.	65 31 49	2993	64 1 27	2985	62 30 55	2977	61 0 14	2969
17	SUN	W.	67 4 39	3300	68 28 50	3289	69 53 14	3276	71 17 53	3264
	ALDEBARAN	W.	26 48 50	2994	28 20 38	2913	29 52 40	2901	31 24 57	2891
	REGULUS	E.	53 24 1	2993	51 52 10	2911	50 20 5	2901	48 47 47	2899
18	SUN	W.	78 25 0	3195	79 51 15	3180	81 17 48	3165	82 44 39	3149
	ALDEBARAN	W.	39 10 13	2997	40 44 6	2913	42 18 17	2798	43 52 47	2794
	REGULUS	E.	41 2 30	2998	39 28 38	2915	37 54 29	2901	36 20 2	2786
	MARS	E.	91 48 46	2709	90 12 9	2689	88 35 15	2676	86 58 3	2663
	SPICA	E.	94 56 32	2656	93 23 17	2643	91 49 45	2639	90 15 55	2615
19	SUN	W.	90 3 45	3066	91 32 36	3049	93 1 48	3031	94 31 22	3014
	ALDEBARAN	W.	51 50 6	2707	53 26 36	2699	55 3 27	2675	56 40 40	2658
	MARS	E.	78 47 19	2590	77 8 10	2574	75 28 40	2558	73 48 48	2543
	SPICA	E.	82 21 55	2739	80 46 7	2723	79 9 58	2707	77 33 28	2691
20	SUN	W.	102 4 55	2990	103 36 49	2901	105 9 7	2881	106 41 50	2869
	ALDEBARAN	W.	64 52 34	2571	66 32 9	2553	68 12 9	2535	69 52 34	2517
	POLLUX	W.	22 1 9	2859	23 34 21	2805	25 8 43	2756	26 44 8	2714
	MARS	E.	65 23 51	2460	63 41 42	2442	61 59 8	2426	60 16 10	2406
	SPICA	E.	69 25 22	2607	67 46 86	2590	66 7 27	2579	64 27 54	2556
21	SUN	W.	114 31 44	2763	116 7 0	2744	117 42 42	2725	119 18 49	2705
	ALDEBARAN	W.	78 21 5	2494	80 4 6	2405	81 47 34	2386	83 31 29	2367
	POLLUX	W.	34 54 2	2545	36 34 13	2517	38 15 3	2489	39 56 31	2463
	SATURN	W.	26 21 0	2438	28 3 41	2419	29 46 49	2401	31 30 23	2382
	MARS	E.	51 35 5	2391	49 49 36	2304	48 3 42	2286	46 17 22	2269
	SPICA	E.	56 4 13	2470	54 22 18	2453	52 39 59	2437	50 57 17	2421
	JUPITER	E.	98 36 32	2403	96 53 1	2384	95 9 3	2365	93 24 38	2346
	ANTARES	E.	101 58 13	2476	100 16 26	2456	98 34 11	2437	96 51 29	2418

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XV <sup>b</sup> .	P. L. of Diff.	XVIII <sup>b</sup> .	P. L. of Diff.	XX <sup>b</sup> .	P. L. of Diff.
12	SUN	W.	18 19 55	3607	19 36 22	3588	20 57 9	3573	22 16 13	3560
	POLLUX	E.	71 20 25	3194	69 52 44	3125	68 25 5	3198	66 57 27	3198
	SATURN	E.	78 41 5	3087	77 12 39	3087	75 44 14	3087	74 15 49	3088
13	SUN	W.	28 54 30	3516	30 14 36	3509	31 34 50	3503	32 55 11	3497
	POLLUX	E.	59 39 35	3131	58 12 3	3131	56 44 31	3131	55 16 59	3139
	SATURN	E.	66 53 42	3084	65 25 13	3083	63 56 43	3089	62 28 11	3080
	REGULUS	E.	95 16 56	3076	93 48 17	3074	92 19 36	3073	90 50 53	3070
14	SUN	W.	39 38 31	3468	40 59 31	3463	42 20 37	3456	43 41 50	3450
	POLLUX	E.	47 59 26	3133	46 31 56	3133	45 4 26	3133	43 36 56	3133
	SATURN	E.	55 4 52	3066	53 36 1	3063	52 7 6	3060	50 38 7	3056
	REGULUS	E.	83 26 35	3056	81 57 32	3053	80 28 25	3050	78 59 14	3046
15	SUN	W.	50 29 45	3415	51 51 44	3408	53 13 52	3400	54 36 9	3391
	POLLUX	E.	36 19 45	3142	34 52 26	3145	33 25 11	3148	31 58 0	3154
	SATURN	E.	43 11 47	3030	41 42 12	3024	40 12 29	3018	38 42 38	3010
	REGULUS	E.	71 31 51	3019	70 2 2	3014	68 32 6	3007	67 2 2	3000
16	SUN	W.	61 30 4	3345	62 53 24	3334	64 16 56	3323	65 40 41	3312
	SATURN	E.	31 11 9	2972	29 40 21	2963	28 9 22	2954	26 38 12	2945
	REGULUS	E.	59 29 22	2960	57 58 19	2951	56 27 5	2942	54 55 39	2932
17	SUN	W.	72 42 47	3251	74 7 56	3237	75 33 21	3224	76 59 2	3209
	ALDEBARAN	W.	32 57 28	2878	34 30 15	2866	36 3 18	2853	37 36 37	2840
	REGULUS	E.	47 15 14	2878	45 42 27	2866	44 9 24	2853	42 36 5	2841
18	SUN	W.	84 11 49	3133	85 39 18	3117	87 7 7	3101	88 35 16	3084
	ALDEBARAN	W.	45 27 36	2769	47 2 44	2755	48 38 11	2740	50 13 58	2724
	REGULUS	E.	34 45 16	2772	33 10 12	2758	31 34 49	2744	29 59 7	2729
	MARS	E.	85 20 33	2649	83 42 44	2635	82 4 36	2620	80 26 8	2604
	SPICA	E.	88 41 46	2799	87 7 17	2785	85 32 29	2770	83 57 22	2755
19	SUN	W.	96 1 18	2995	97 31 37	2977	99 2 19	2958	100 33 25	2939
	ALDEBARAN	W.	58 18 16	2641	59 56 15	2624	61 34 37	2607	63 13 23	2588
	MARS	E.	72 8 34	2527	70 27 58	2510	68 46 59	2494	67 5 37	2477
	SPICA	E.	75 56 36	2675	74 19 22	2657	72 41 45	2640	71 3 45	2624
20	SUN	W.	108 14 58	2842	109 48 31	2822	111 22 30	2803	112 56 54	2783
	ALDEBARAN	W.	71 33 24	2498	73 14 40	2480	74 56 22	2461	76 38 30	2442
	POLLUX	W.	28 20 29	2675	29 57 42	2639	31 35 44	2605	33 14 32	2574
	MARS	E.	58 32 47	2391	56 48 59	2373	55 4 46	2358	53 20 8	2339
	SPICA	E.	62 47 58	2538	61 7 37	2521	59 26 53	2504	57 45 45	2487
21	SUN	W.	120 55 22	2686	122 32 21	2667	124 9 45	2649	125 47 34	2629
	ALDEBARAN	W.	85 15 51	2348	87 0 40	2331	88 45 55	2312	90 31 37	2294
	POLLUX	W.	41 38 36	2438	43 21 16	2415	45 4 30	2391	46 48 18	2368
	SATURN	W.	33 14 24	2363	34 58 52	2344	36 43 47	2325	38 29 10	2307
	MARS	E.	44 30 37	2252	42 43 27	2235	40 55 52	2219	39 7 53	2202
	SPICA	E.	49 14 12	2405	47 30 45	2390	45 46 56	2376	44 2 47	2362
	JUPITER	E.	91 39 46	2328	89 54 27	2309	88 8 41	2291	86 22 29	2273
	ANTARES	E.	95 8 20	2309	93 24 44	2281	91 40 42	2262	89 56 13	2244

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## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
22	Pollux W.	48 32 38	9346	50 17 30	9394	52 2 54	9304	53 48 48	9294
	SATURN W.	40 15 0	9289	42 1 16	9271	43 47 58	9253	45 35 6	9236
	MARS E.	37 19 29	9186	35 30 41	9171	33 41 30	9156	31 51 56	9149
	Spica E.	42 18 17	9348	40 33 28	9337	38 48 22	9325	37 2 59	9315
	JUPITER E.	84 35 50	9255	82 48 44	9237	81 1 12	9220	79 13 14	9203
	Antares E.	88 11 18	9296	86 25 57	9209	84 40 10	9291	82 53 57	9274
23	Pollux W.	62 45 25	9192	64 34 5	9175	66 23 10	9159	68 12 39	9144
	SATURN W.	54 37 6	9154	56 26 43	9139	58 16 42	9125	60 7 3	9111
	Regulus W.	26 34 29	9147	28 24 16	9139	30 14 27	9117	32 5 0	9103
	JUPITER E.	70 7 8	9122	68 16 43	9107	66 25 55	9093	64 34 45	9079
	Antares E.	73 56 54	9196	72 8 21	9183	70 19 28	9170	68 30 15	9157
24	Pollux W.	77 25 34	9077	79 17 8	9066	81 8 59	9056	83 1 6	9046
	SATURN W.	69 23 59	9048	71 16 18	9038	73 8 53	9028	75 1 43	9019
	Regulus W.	41 23 5	9038	43 15 40	9028	45 8 31	9017	47 1 38	9008
	JUPITER E.	55 13 54	9019	53 20 50	9009	51 27 30	9000	49 33 55	1991
	Antares E.	59 19 43	9105	57 28 52	9098	55 37 50	9091	53 46 37	9086
25	SATURN W.	84 29 11	1984	86 23 11	1979	88 17 19	1975	90 11 33	1972
	Regulus W.	56 30 31	1972	58 24 49	1967	60 19 15	1963	62 13 47	1960
	JUPITER E.	40 3 6	1961	38 8 31	1958	36 13 51	1956	34 19 8	1955
	Antares E.	44 29 7	9078	42 37 34	9081	40 46 6	9087	38 54 47	9086
26	Regulus W.	71 47 18	1956	73 42 1	1958	75 36 42	1960	77 31 19	1964
	MARS W.	23 58 19	1900	25 54 32	1898	27 50 49	1897	29 47 7	1896
	α Aquilæ E.	78 59 36	9556	77 19 41	9567	75 40 1	9580	74 0 39	9586
27	Regulus W.	87 2 38	1992	88 56 25	2000	90 49 59	2009	92 43 20	2018
	MARS W.	39 27 44	1918	41 23 29	1906	43 19 3	1933	45 14 24	1941
	Spica W.	33 42 46	9091	35 33 59	9080	37 25 14	9091	39 16 27	9094
	α Aquilæ E.	65 50 11	9711	64 13 46	9749	62 38 2	9777	61 3 4	9815
	Fomalhaut E.	98 8 42	9231	96 21 1	9237	94 33 29	9245	92 46 8	9253
28	MARS W.	54 47 19	1995	56 41 1	2008	58 34 23	2021	60 27 24	2035
	Spica W.	48 30 43	9198	50 20 59	9138	52 11 0	9149	54 0 44	9161
	α Aquilæ E.	53 22 12	3068	51 53 23	3133	50 25 54	3205	48 59 51	3284
	Fomalhaut E.	83 53 3	9213	82 7 22	9228	80 22 3	9244	78 37 7	9261
29	MARS W.	69 46 51	2111	71 37 33	2128	73 27 49	2145	75 17 40	2162
	Spica W.	63 4 36	9230	64 52 19	9245	66 39 39	9261	68 26 36	9277
	JUPITER W.	21 3 22	9212	22 51 31	9221	24 39 27	9239	26 27 7	9244
	Fomalhaut E.	69 59 8	9462	68 17 2	9486	66 35 29	9510	64 54 30	9536
	α Pegasi E.	85 52 57	9555	84 13 0	9574	82 33 29	9594	80 54 26	9615
	SUN E.	134 18 45	2524	132 38 5	2540	130 57 47	2556	129 17 52	2574
30	Spica W.	77 15 14	9263	78 59 42	9280	80 43 45	9298	82 27 22	9316
	JUPITER W.	35 20 30	9218	37 6 4	9234	38 51 14	9250	40 36 0	9268
	Antares W.	31 55 15	2507	33 36 19	2510	35 17 19	2515	36 58 12	2522
	Fomalhaut E.	56 38 58	9683	55 1 55	9716	53 25 36	9751	51 50 4	9788
	α Pegasi E.	72 46 40	9734	71 10 45	9760	69 35 25	9786	68 0 42	9817
	SUN E.	121 4 17	2663	119 26 48	2683	117 49 45	2701	116 13 7	2720

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## LUNAR DISTANCES.

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22	Pollux W.	55° 35' 11"	2284	57° 22' 3"	2245	59° 9' 23"	2227	60° 57' 11"	2209
	SATURN W.	47 22 40	2219	49 10 39	2202	50 59 4	2186	52 47 53	2170
	MARS E.	30 2 1	2128	28 11 45	2115	26 21 9	2104	24 30 16	2084
	Spica E.	35 17 22	2307	33 31 32	2300	31 45 32	2296	29 59 27	2285
	JUPITER E.	77 24 51	2186	75 36 2	2169	73 46 48	2153	71 57 10	2137
	Antares E.	81 7 20	2258	79 20 18	2242	77 32 53	2227	75 45 5	2211
23	Pollux W.	70 2 31	2129	71 52 46	2115	73 43 22	2102	75 34 18	2089
	SATURN W.	61 57 46	2097	63 48 50	2084	65 40 14	2072	67 31 57	2059
	Regulus W.	33 55 55	2088	35 47 12	2075	37 38 50	2062	39 30 48	2050
	JUPITER E.	62 43 14	2066	60 51 22	2053	58 59 11	2041	57 6 41	2030
	Antares E.	66 40 42	2145	64 50 51	2134	63 0 44	2124	61 10 21	2114
24	Pollux W.	84 53 28	2037	86 46 4	2030	88 38 52	2023	90 31 51	2016
	SATURN W.	76 54 48	2010	78 48 6	2002	80 41 37	1986	82 35 19	1989
	Regulus W.	48 55 0	2000	50 48 35	1991	52 42 23	1984	54 36 22	1978
	JUPITER E.	47 40 7	1984	45 46 7	1977	43 51 56	1970	41 57 35	1965
	Antares E.	51 55 16	2082	50 3 49	2079	48 12 17	2077	46 20 42	2077
25	SATURN W.	92 5 51	1970	94 0 13	1968	95 54 38	1967	97 49 4	1968
	Regulus W.	64 8 24	1958	66 3 5	1956	67 57 49	1955	69 52 34	1956
	JUPITER E.	32 24 23	1955	30 29 38	1957	28 34 56	1960	26 40 19	1966
	Antares E.	37 3 40	2105	35 12 49	2118	33 22 18	2135	31 32 12	2155
26	Regulus W.	79 25 50	1968	81 20 15	1973	83 14 32	1979	85 8 40	1985
	MARS W.	31 43 24	1899	33 39 38	1902	35 35 47	1906	37 31 50	1912
	α Aquilæ E.	72 21 38	2013	70 43 1	2034	69 4 52	2057	67 27 14	2083
27	Regulus W.	94 36 26	2028	96 29 16	2039	98 21 50	2050	100 14 7	2061
	MARS W.	47 9 31	1951	49 4 23	1961	50 58 59	1972	52 53 18	1983
	Spica W.	41 7 36	2098	42 58 38	2104	44 49 31	2111	46 40 13	2119
	α Aquilæ E.	59 28 56	2057	57 55 42	2063	56 23 27	2053	54 52 15	2048
	Fomalhaut E.	90 58 59	2202	89 12 4	2273	87 25 25	2285	85 39 4	2299
28	MARS W.	62 20 3	2050	64 12 19	2064	66 4 13	2079	67 55 44	2095
	Spica W.	55 50 10	2174	57 39 17	2187	59 28 4	2200	61 16 31	2215
	α Aquilæ E.	47 35 21	2371	46 12 31	2465	44 51 28	2570	43 32 21	2685
	Fomalhaut E.	76 52 36	2379	75 8 31	2398	73 24 54	2419	71 41 46	2440
29	MARS W.	77 7 5	2179	78 56 4	2196	80 44 37	2214	82 32 43	2233
	Spica W.	70 13 9	2224	71 59 17	2231	73 45 1	2238	75 30 20	2245
	JUPITER W.	28 14 29	2257	30 1 31	2271	31 48 13	2286	33 34 33	2299
	Fomalhaut E.	63 14 7	2253	61 34 21	2291	59 55 13	2290	58 16 45	2280
	α Pegasi E.	79 15 51	2236	77 37 45	2260	76 0 11	2284	74 23 9	2278
	SUN E.	127 38 21	2591	125 59 13	2609	124 20 30	2626	122 42 11	2645
30	Spica W.	84 10 34	2435	85 53 19	2453	87 35 38	2471	89 17 32	2489
	JUPITER W.	42 20 21	2384	44 4 18	2402	45 47 50	2419	47 30 58	2436
	Antares W.	38 38 55	2530	40 19 27	2539	41 59 46	2550	43 39 50	2569
	Fomalhaut E.	50 15 21	2628	48 41 29	2660	47 8 31	2693	45 36 29	2726
	α Pegasi E.	66 26 36	2647	64 53 9	2679	63 20 23	2711	61 48 18	2744
	SUN E.	114 36 54	2740	113 1 7	2759	111 25 45	2778	109 50 48	2796

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.			
Tues.	1	<sup>h</sup> 2 <sup>m</sup> 36 <sup>s</sup> 16.77	9.555	N. 15° 17' 32".4	+44.91	15' 54".06	66.11	<sup>m</sup> 3 <sup>s</sup> 5.19	0.300
Wed.	2	2 40 6.38	9.579	15 35 22.7	44.28	15 53 83	66.19	3 12.11	0.276
Thur.	3	2 43 56.55	9.602	15 52 57.6	43.63	15 53.60	66.27	3 18.47	0.253
Frid.	4	2 47 47.29	9.626	16 10 16.8	+42.97	15 53.37	66.35	3 24.26	0.229
Sat.	5	2 51 38.62	9.650	16 27 20.1	42.30	15 53.14	66.43	3 29.48	0.205
SUN.	6	2 55 30.53	9.675	16 44 7.0	41.61	15 52.91	66.51	3 34.12	0.180
Mon.	7	2 59 23.02	9.699	17 0 37.4	+40.91	15 52.68	66.59	3 38.17	0.156
Tues.	8	3 3 16.10	9.724	17 16 50.9	40.20	15 52.46	66 68	3 41.63	0.131
Wed.	9	3 7 9.77	9.749	17 32 47.2	39.48	15 52.24	66.76	3 44.51	0.107
Thur.	10	3 11 4.01	9.773	17 48 25.9	+38.74	15 52.03	66.84	3 46.81	0.083
Frid.	11	3 14 58.83	9.797	18 3 46.8	37.99	15 51.82	66.92	3 48.54	0.059
Sat.	12	3 18 54.23	9.820	18 18 49.6	37.23	15 51.61	67.01	3 49.70	0.036
SUN.	13	3 22 50.20	9.844	18 33 34.0	+36.46	15 51.41	67.09	3 50.29	0.012
Mon.	14	3 26 46.73	9.867	18 47 59.6	35.67	15 51.22	67.17	3 50.32	0.011
Tues.	15	3 30 43.81	9.890	19 2 6.1	34.87	15 51.03	67.25	3 49.79	0.034
Wed.	16	3 34 41.44	9.913	19 15 53.3	+34.06	15 50.84	67.34	3 48.72	0.057
Thur.	17	3 38 39.62	9.936	19 29 20.8	33.23	15 50.66	67.42	3 47.10	0.080
Frid.	18	3 42 38.35	9.958	19 42 28.5	32.40	15 50.48	67.50	3 44.93	0.102
Sat.	19	3 46 37.62	9.980	19 55 16.1	+31.56	15 50.30	67.58	3 42.23	0.124
SUN.	20	3 50 37.41	10.002	20 7 43.2	30.70	15 50.12	67.65	3 39.01	0.146
Mon.	21	3 54 37.72	10.024	20 19 49.7	29.83	15 49.95	67.73	3 35.26	0.168
Tues.	22	3 58 38.55	10.046	20 31 35.3	+28.95	15 49.78	67.80	3 31.00	0.189
Wed.	23	4 2 39.89	10.067	20 42 59.7	28.06	15 49.61	67.88	3 26.23	0.210
Thur.	24	4 6 41.74	10.088	20 54 2.8	27.17	15 49.45	67.95	3 20.95	0.231
Frid.	25	4 10 44.08	10.109	21 4 44.2	+26.27	15 49.29	68.02	3 15.17	0.252
Sat.	26	4 14 46.92	10.129	21 15 3.9	25.36	15 49.13	68.09	3 8.91	0.272
SUN.	27	4 18 50.24	10.149	21 25 1.7	24.44	15 48.97	68.15	3 2.17	0.292
Mon.	28	4 22 54.03	10.168	21 34 37.2	+23.51	15 48.82	68.22	2 54.95	0.311
Tues.	29	4 26 58.29	10.187	21 43 50.4	22.57	15 48.67	68.28	2 47.27	0.330
Wed.	30	4 31 3.00	10.205	21 52 41.1	21.63	15 48.52	68.34	2 39.14	0.348
Thur.	31	4 35 8.15	10.223	22 1 9.0	20.68	15 48.38	68.40	2 30.57	0.366
Frid.	32	4 39 13.73	10.241	N. 22 9 14.0	+19.72	15 48.24	68.45	2 21.58	0.384

NOTE.—The mean time of semidiameter passing may be found by subtracting 0".18 from the sideral time.  
The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Tues.	1	2 36 17.26	9.556	N. 15 17 34.6	+44.91	3 5.20	0.300	2 39 22.46
Wed.	2	2 40 6.89	9.580	15 35 24.9	44.28	3 12.13	0.276	2 43 19.02
Thur.	3	2 43 57.08	9.603	15 52 59.9	43.63	3 18.49	0.253	2 47 15.57
Frid.	4	2 47 47.85	9.627	16 10 19.2	+42.97	3 24.28	0.229	2 51 12.13
Sat.	5	2 51 39.19	9.651	16 27 22.5	42.30	3 29.49	0.205	2 55 8.68
SUN.	6	2 55 31.11	9.676	16 44 9.5	41.61	3 34.13	0.180	2 59 5.24
Mon.	7	2 59 23.61	9.700	17 0 39.9	+40.91	3 38.18	0.156	3 3 1.79
Tues.	8	3 3 16.70	9.725	17 16 53.4	40.20	3 41.64	0.131	3 6 58.35
Wed.	9	3 7 10.38	9.749	17 32 49.7	39.48	3 44.52	0.107	3 10 54.90
Thur.	10	3 11 4.63	9.773	17 48 28.4	+38.74	3 46.84	0.083	3 14 51.46
Frid.	11	3 14 59.46	9.797	18 3 49.3	37.99	3 48.55	0.059	3 18 48.01
Sat.	12	3 18 54.86	9.820	18 18 52.1	37.23	3 49.71	0.036	3 22 44.57
SUN.	13	3 22 50.83	9.844	18 33 36.4	+36.46	3 50.30	0.012	3 26 41.12
Mon.	14	3 26 47.36	9.867	18 48 1.9	35.67	3 50.32	0.011	3 30 37.68
Tues.	15	3 30 44.44	9.890	19 2 8.4	34.87	3 49.79	0.034	3 34 34.23
Wed.	16	3 34 42.07	9.913	19 15 55.5	+34.06	3 48.72	0.057	3 38 30.80
Thur.	17	3 38 40.25	9.936	19 29 23.0	33.23	3 47.10	0.080	3 42 27.35
Frid.	18	3 42 38.98	9.958	19 42 30.6	32.40	3 44.93	0.102	3 46 23.91
Sat.	19	3 46 38.24	9.980	19 55 18.1	+31.56	3 42.22	0.124	3 50 20.46
SUN.	20	3 50 38.02	10.002	20 7 45.1	30.70	3 39.00	0.146	3 54 17.02
Mon.	21	3 54 38.32	10.024	20 19 51.5	29.83	3 35.25	0.168	3 58 13.57
Tues.	22	3 58 39.14	10.045	20 31 37.0	+28.95	3 30.99	0.189	4 2 10.13
Wed.	23	4 2 40.47	10.066	20 43 1.3	28.06	3 26.22	0.210	4 6 6.68
Thur.	24	4 6 42.30	10.087	20 54 4.3	27.17	3 20.94	0.231	4 10 3.24
Frid.	25	4 10 44.63	10.108	21 4 45.7	+26.27	3 15.16	0.252	4 13 59.79
Sat.	26	4 14 47.45	10.128	21 15 5.3	25.36	3 8.90	0.272	4 17 56.36
SUN.	27	4 18 50.75	10.148	21 25 3.0	24.44	3 2.16	0.292	4 21 52.91
Mon.	28	4 22 54.52	10.167	21 34 38.4	+23.51	2 54.94	0.311	4 25 49.47
Tues.	29	4 26 58.76	10.186	21 43 51.5	22.57	2 47.26	0.330	4 29 46.02
Wed.	30	4 31 3.45	10.204	21 52 42.1	21.63	2 39.13	0.348	4 33 42.58
Thur.	31	4 35 8 58	10.222	22 1 9.9	20.68	2 30.56	0.366	4 37 39.13
Frid.	32	4 39 14.13	10.240	N 22 9 14.8	+19.72	2 21.57	0.384	4 41 35.69

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

Diff. for 1 hour,  
+9.8565.  
(Table III.)



AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	122	41° 30' 48.7	30' 47.7	145.38	— 0.02	0.0035916	+45.7	21 <sup>h</sup> 17 <sup>m</sup> 7.73 <sup>s</sup>
2	123	42 28 57.0	28 55.9	145.32	0.15	0.0037008	45.3	21 13 11.82
3	124	43 27 3.9	27 2.7	145.26	0.28	0.0038090	44.8	21 9 15.92
4	125	44 25 9.3	25 8.0	145.20	— 0.42	0.0039161	+44.3	21 5 20.01
5	126	45 23 13.4	23 11.9	145.14	0.54	0.0040219	43.7	21 1 24.10
6	127	46 21 16.1	21 14.5	145.08	0.64	0.0041262	43.1	20 57 28.19
7	128	47 19 17.4	19 15.7	145.02	— 0.72	0.0042289	+42.4	20 53 32.28
8	129	48 17 17.2	17 15.4	144.96	0.79	0.0043299	41.7	20 49 36.37
9	130	49 15 15.7	15 13.7	144.90	0.81	0.0044290	40.9	20 45 40.46
10	131	50 13 12.7	13 10.5	144.84	— 0.80	0.0045262	+40.1	20 41 44.55
11	132	51 11 8.1	11 5.8	144.78	0.76	0.0046216	39.3	20 37 48.64
12	133	52 9 2.0	8 59.6	144.71	0.71	0.0047151	38.5	20 33 52.73
13	134	53 6 54.3	6 51.8	144.65	— 0.62	0.0048065	+37.7	20 29 56.82
14	135	54 4 45.0	4 42.3	144.58	0.51	0.0048960	36.9	20 26 0.91
15	136	55 2 34.0	2 31.2	144.51	0.38	0.0049836	36.1	20 22 5.00
16	137	56 0 21.4	0 18.4	144.44	— 0.25	0.0050694	+35.4	20 18 9.09
17	138	56 58 7.1	58 4.0	144.37	— 0.12	0.0051534	34.7	20 14 13.18
18	139	57 55 51.2	55 48.0	144.30	+ 0.01	0.0052357	34.0	20 10 17.27
19	140	58 53 33.7	53 30.3	144.23	+ 0.12	0.0053165	+33.4	20 6 21.36
20	141	59 51 14.6	51 11.0	144.17	0.20	0.0053960	32.9	20 2 25.45
21	142	60 48 53.9	48 50.2	144.11	0.27	0.0054744	32.3	19 58 29.54
22	143	61 46 31.7	46 27.9	144.05	+ 0.31	0.0055514	+31.8	19 54 33.63
23	144	62 44 8.2	44 4.1	143.99	0.32	0.0056272	31.3	19 50 37.72
24	145	63 41 43.2	41 38.9	143.93	0.29	0.0057020	30.9	19 46 41.81
25	146	64 39 16.9	39 12.5	143.88	+ 0.23	0.0057757	+30.5	19 42 45.90
26	147	65 36 49.5	36 45.0	143.83	0.16	0.0058484	30.1	19 38 49.99
27	148	66 34 21.0	34 16.4	143.79	+ 0.06	0.0059200	29.6	19 34 54.08
28	149	67 31 51.6	31 46.8	143.75	— 0.06	0.0059904	+29.1	19 30 58.17
29	150	68 29 21.2	29 16.2	143.71	0.19	0.0060596	28.6	19 27 2.26
30	151	69 26 49.9	26 44.7	143.68	0.32	0.0061275	28.0	19 23 6.35
31	152	70 24 17.9	24 12.6	143.65	0.45	0.0061939	27.3	19 19 10.44
32	153	71 21 45.2	21 39.8	143.63	— 0.58	0.0062587	+26.6	19 15 14.53
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>d</sup> .0.								
								Diff. for 1 Hour, — 9 <sup>s</sup> .8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	THE MOON'S								
	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
1	15' 52.0	15' 44.3	58' 7.0	-2.36	57' 38.9	-2.31	<sup>h</sup> 17 <sup>m</sup> 39.1	<sup>m</sup> 2.23	<sup>d</sup> 20.1
2	15 36.9	15 29.8	57 11.7	2.22	56 45.7	2.10	18 31.1	2.09	21.1
3	15 23.2	15 17.0	56 21.3	1.96	55 58.6	1.81	19 19.7	1.96	22.1
4	15 11.3	15 6.2	55 37.8	-1.65	55 18.9	-1.49	20 5.4	1.85	23.1
5	15 1.6	14 57.6	55 2.1	1.32	54 47.3	1.15	20 48.9	1.78	24.1
6	14 54.1	14 51.2	54 34.5	0.98	54 23.7	0.82	21 31.1	1.74	25.1
7	14 48.7	14 46.8	54 14.8	-0.67	54 7.6	-0.53	22 12.7	1.73	26.1
8	14 45.3	14 44.2	54 2.1	0.39	53 58.2	0.26	22 54.5	1.75	27.1
9	14 43.6	14 43.4	53 55.9	-0.13	53 55.0	-0.01	23 37.1	1.80	28.1
10	14 43.5	14 44.0	53 55.6	+0.10	53 57.5	+0.21	6		29.1
11	14 44.9	14 46.1	54 0.7	0.32	54 5.2	0.43	0 21.1	1.87	0.4
12	14 47.7	14 49.7	54 11.1	0.54	54 18.3	0.65	1 6.7	1.94	1.4
13	14 52.0	14 54.7	54 26.8	+0.77	54 36.8	+0.90	1 54.2	2.02	2.4
14	14 57.9	15 1.4	54 48.3	1.02	55 1.2	1.14	2 43.3	2.08	3.4
15	15 5.3	15 9.7	55 15.6	1.27	55 31.7	1.41	3 33.7	2.12	4.4
16	15 14.5	15 19.7	55 49.4	+1.54	56 8.6	+1.66	4 24.7	2.13	5.4
17	15 25.4	15 31.4	56 29.3	1.79	56 51.5	1.90	5 15.9	2.13	6.4
18	15 37.8	15 44.5	57 15.0	2.00	57 39.5	2.08	6 6.9	2.12	7.4
19	15 51.4	15 58.4	58 4.8	+2.13	58 30.6	+2.15	6 57.7	2.12	8.4
20	16 5.4	16 12.3	58 56.4	2.13	59 21.6	2.06	7 48.6	2.13	9.4
21	16 18.9	16 25.0	59 45.8	1.95	60 8.3	1.78	8 40.2	2.18	10.4
22	16 30.5	16 35.2	60 28.5	+1.56	60 45.8	+1.29	9 33.2	2.25	11.4
23	16 38.9	16 41.5	60 59.4	0.97	61 8.9	+0.61	10 28.4	2.35	12.4
24	16 42.9	16 43.0	61 14.0	+0.23	61 14.3	-0.18	11 26.1	2.46	13.4
25	16 41.7	16 39.2	61 9.7	-0.58	61 0.4	-0.96	12 26.1	2.54	14.4
26	16 35.4	16 30.6	60 46.6	1.32	60 28.7	1.63	13 27.5	2.56	15.4
27	16 24.8	16 18.2	60 7.4	1.90	59 43.2	2.11	14 28.5	2.51	16.4
28	16 11.0	16 3.4	59 16.8	-2.26	58 48.9	-2.36	15 27.3	2.37	17.4
29	15 55.6	15 47.7	58 20.2	2.40	57 51.3	2.39	16 22.6	2.22	18.4
30	15 39.9	15 32.4	57 22.8	2.33	56 55.3	2.24	17 14.1	2.06	19.4
31	15 25.8	15 18.6	56 29.1	2.12	56 4.5	1.97	18 1.9	1.93	20.4
32	15 12.5	15 6.9	55 41.9	-1.80	55 21.4	-1.61	18 46.9	1.82	21.4

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 1.					THURSDAY 3.				
0	19 39 36.59	2.4119	S. 20° 29' 35.7"	2.788	0	21 29 19.72	2.1571	S. 16° 14' 24.6"	7.459
1	19 42 1.16	2.4070	20 26 44.8	2.909	1	21 31 28.99	2.1519	16 6 54.9	7.532
2	19 44 25.43	2.4021	20 23 46.6	3.039	2	21 33 37.95	2.1468	15 59 20.8	7.604
3	19 46 49.41	2.3972	20 20 41.3	3.147	3	21 35 46.60	2.1417	15 51 42.4	7.675
4	19 49 13.09	2.3922	20 17 28.9	3.265	4	21 37 54.95	2.1366	15 43 59.8	7.744
5	19 51 36.47	2.3871	20 14 9.5	3.381	5	21 40 2.99	2.1314	15 36 13.1	7.812
6	19 53 59.54	2.3820	20 10 43.2	3.497	6	21 42 10.72	2.1263	15 28 22.3	7.880
7	19 56 22.31	2.3769	20 7 9.9	3.612	7	21 44 18.15	2.1213	15 20 27.5	7.947
8	19 58 44.77	2.3717	20 3 29.7	3.726	8	21 46 25.28	2.1163	15 12 28.6	8.014
9	20 1 6.92	2.3666	19 59 42.8	3.839	9	21 48 32.11	2.1114	15 4 25.8	8.079
10	20 3 28.76	2.3614	19 55 49.1	3.951	10	21 50 38.65	2.1065	14 56 19.1	8.143
11	20 5 50.29	2.3562	19 51 48.7	4.062	11	21 52 44.89	2.1016	14 48 8.6	8.207
12	20 8 11.51	2.3510	19 47 41.7	4.172	12	21 54 50.84	2.0967	14 39 54.3	8.269
13	20 10 32.41	2.3457	19 43 28.1	4.281	13	21 56 56.50	2.0919	14 31 36.3	8.331
14	20 12 52.99	2.3404	19 39 8.0	4.388	14	21 59 1.87	2.0872	14 23 14.6	8.391
15	20 15 13.26	2.3351	19 34 41.5	4.495	15	22 1 6.96	2.0824	14 14 49.4	8.450
16	20 17 33.20	2.3297	19 30 8.6	4.602	16	22 3 11.76	2.0777	14 6 20.6	8.509
17	20 19 52.82	2.3243	19 25 29.3	4.707	17	22 5 16.28	2.0730	13 57 48.3	8.567
18	20 22 12.12	2.3190	19 20 43.8	4.810	18	22 7 20.52	2.0683	13 49 12.6	8.624
19	20 24 31.10	2.3136	19 15 52.1	4.913	19	22 9 24.48	2.0637	13 40 33.5	8.680
20	20 26 49.75	2.3082	19 10 54.2	5.016	20	22 11 28.17	2.0592	13 31 51.0	8.736
21	20 29 8.08	2.3027	19 5 50.2	5.117	21	22 13 31.59	2.0547	13 23 5.2	8.790
22	20 31 26.08	2.2972	19 0 40.2	5.217	22	22 15 34.74	2.0502	13 14 16.2	8.843
23	20 33 43.75	2.2918	S. 18° 55' 24.2"	5.315	23	22 17 37.62	2.0457	S. 13° 5' 24.1"	8.895
WEDNESDAY 2.					FRIDAY 4.				
0	20 36 1.10	2.2863	S. 18° 50' 2.4"	5.413	0	22 19 40.23	2.0413	S. 12° 56' 28.8"	8.947
1	20 38 18.12	2.2809	18 44 34.7	5.510	1	22 21 42.58	2.0370	12 47 30.4	8.996
2	20 40 34.81	2.2755	18 39 1.2	5.606	2	22 23 44.67	2.0327	12 38 29.0	9.048
3	20 42 51.18	2.2701	18 33 22.0	5.701	3	22 25 46.51	2.0285	12 29 24.7	9.097
4	20 45 7.22	2.2646	18 27 37.1	5.795	4	22 27 48.09	2.0243	12 20 17.4	9.145
5	20 47 22.93	2.2592	18 21 46.6	5.887	5	22 29 49.42	2.0202	12 11 7.3	9.192
6	20 49 38.32	2.2537	18 15 50.6	5.979	6	22 31 50.51	2.0161	12 1 54.4	9.239
7	20 51 53.38	2.2482	18 9 49.1	6.070	7	22 33 51.35	2.0119	11 52 38.7	9.285
8	20 54 8.11	2.2427	18 3 42.2	6.160	8	22 35 51.94	2.0078	11 43 20.2	9.330
9	20 56 22.51	2.2372	17 57 29.9	6.249	9	22 37 52.29	2.0038	11 33 59.1	9.374
10	20 58 36.58	2.2318	17 51 12.3	6.337	10	22 39 52.40	1.9999	11 24 35.4	9.417
11	21 0 50.33	2.2264	17 44 49.5	6.423	11	22 41 52.28	1.9961	11 15 9.1	9.460
12	21 3 3.75	2.2210	17 38 21.6	6.508	12	22 43 51.93	1.9922	11 5 40.2	9.502
13	21 5 16.85	2.2156	17 31 48.6	6.593	13	22 45 51.35	1.9884	10 56 8.9	9.542
14	21 7 29.62	2.2102	17 25 10.5	6.678	14	22 47 50.54	1.9846	10 46 35.2	9.582
15	21 9 42.07	2.2048	17 18 27.3	6.761	15	22 49 49.50	1.9809	10 36 59.1	9.622
16	21 11 54.20	2.1995	17 11 39.2	6.842	16	22 51 48.25	1.9773	10 27 20.6	9.661
17	21 14 6.01	2.1941	17 4 46.3	6.922	17	22 53 46.78	1.9737	10 17 39.8	9.698
18	21 16 17.49	2.1887	16 57 48.6	7.001	18	22 55 45.09	1.9701	10 7 56.8	9.735
19	21 18 28.65	2.1834	16 50 46.2	7.080	19	22 57 43.19	1.9666	9 58 11.6	9.771
20	21 20 39.50	2.1782	16 43 39.0	7.158	20	22 59 41.08	1.9631	9 48 24.3	9.806
21	21 22 50.03	2.1729	16 36 27.2	7.235	21	23 1 38.76	1.9597	9 38 34.9	9.841
22	21 25 0.24	2.1676	16 29 10.8	7.311	22	23 3 36.24	1.9564	9 28 43.4	9.876
23	21 27 10.14	2.1623	16 21 49.9	7.385	23	23 5 33.52	1.9531	9 18 49.8	9.907
24	21 29 19.72	2.1571	S. 16° 11' 24.6"	7.459	24	23 7 30.61	1.9498	S. 9° 8' 54.3"	9.941

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 5.					MONDAY 7.				
0	<sup>h</sup> 23 <sup>m</sup> 7 <sup>s</sup> 30.61	1.9498	S. 9° 8' 54.3"	9.941	0	<sup>h</sup> 0 38 <sup>m</sup> 19.16	1.8537	S. 0° 47' 45.1"	10.685
1	23 9 27.50	1.9496	8 58 56.9	9.972	1	0 40 10.36	1.8530	0 37 4.0	10.684
2	23 11 24.20	1.9434	8 48 57.6	10.003	2	0 42 1.52	1.8522	0 26 23.0	10.683
3	23 13 20.71	1.9403	8 38 56.5	10.033	3	0 43 52.63	1.8515	0 15 42.0	10.682
4	23 15 17.04	1.9372	8 28 53.6	10.063	4	0 45 43.70	1.8509	S. 0 5 1.2	10.679
5	23 17 13.18	1.9342	8 18 49.0	10.092	5	0 47 34.74	1.8504	N. 0 5 39.5	10.670
6	23 19 9.14	1.9313	8 8 42.6	10.121	6	0 49 25.75	1.8499	0 16 20.0	10.673
7	23 21 4.93	1.9284	7 58 34.5	10.147	7	0 51 16.73	1.8495	0 27 0.3	10.669
8	23 23 0.55	1.9255	7 48 24.9	10.173	8	0 53 7.69	1.8491	0 37 40.3	10.664
9	23 24 55.99	1.9227	7 38 13.7	10.199	9	0 54 58.62	1.8487	0 48 20.0	10.659
10	23 26 51.27	1.9200	7 28 1.0	10.224	10	0 56 49.53	1.8484	0 58 59.4	10.653
11	23 28 46.39	1.9173	7 17 46.8	10.249	11	0 58 40.42	1.8481	1 9 38.4	10.647
12	23 30 41.35	1.9147	7 7 31.1	10.273	12	1 0 31.30	1.8478	1 20 17.0	10.639
13	23 32 36.15	1.9121	6 57 14.0	10.296	13	1 2 22.16	1.8477	1 30 55.1	10.631
14	23 34 30.80	1.9095	6 46 55.6	10.318	14	1 4 13.02	1.8476	1 41 32.7	10.623
15	23 36 25.29	1.9069	6 36 35.9	10.339	15	1 6 3.87	1.8475	1 52 9.9	10.615
16	23 38 19.63	1.9045	6 26 14.9	10.361	16	1 7 54.72	1.8475	2 2 46.5	10.605
17	23 40 13.83	1.9022	6 15 52.6	10.382	17	1 9 45.57	1.8475	2 13 22.5	10.594
18	23 42 7.89	1.8998	6 5 29.1	10.401	18	1 11 36.42	1.8476	2 23 57.8	10.583
19	23 44 1.81	1.8975	5 55 4.5	10.419	19	1 13 27.28	1.8477	2 34 32.5	10.571
20	23 45 55.59	1.8952	5 44 38.8	10.438	20	1 15 18.15	1.8479	2 45 6.4	10.559
21	23 47 49.24	1.8931	5 34 12.0	10.456	21	1 17 9.03	1.8481	2 55 39.6	10.547
22	23 49 42.76	1.8910	5 23 44.1	10.473	22	1 18 59.92	1.8483	3 6 12.0	10.534
23	23 51 36.16	1.8890	S. 5 13 15.2	10.489	23	1 20 50.82	1.8485	N. 3 16 43.6	10.520
SUNDAY 6.					TUESDAY 8.				
0	23 53 29.44	1.8870	S. 5 2 45.4	10.504	0	1 22 41.74	1.8489	N. 3 27 14.4	10.506
1	23 55 22.60	1.8850	4 52 14.7	10.519	1	1 24 32.69	1.8493	3 37 44.3	10.490
2	23 57 15.64	1.8830	4 41 43.1	10.534	2	1 26 23.66	1.8497	3 48 13.2	10.474
3	23 59 8.56	1.8811	4 31 10.6	10.547	3	1 28 14.66	1.8502	3 58 41.2	10.458
4	0 1 1.37	1.8793	4 20 37.4	10.560	4	1 30 5.69	1.8507	4 9 8.2	10.441
5	0 2 54.08	1.8776	4 10 3.4	10.572	5	1 31 56.75	1.8512	4 19 34.1	10.423
6	0 4 46.68	1.8759	3 59 28.7	10.584	6	1 33 47.84	1.8518	4 29 58.9	10.405
7	0 6 39.18	1.8742	3 48 53.3	10.595	7	1 35 38.97	1.8525	4 40 22.7	10.387
8	0 8 31.58	1.8726	3 38 17.3	10.605	8	1 37 30.14	1.8532	4 50 45.3	10.367
9	0 10 23.89	1.8710	3 27 40.7	10.615	9	1 39 21.36	1.8540	5 1 6.7	10.347
10	0 12 16.10	1.8695	3 17 3.5	10.624	10	1 41 12.62	1.8548	5 11 26.9	10.326
11	0 14 8.23	1.8681	3 6 25.8	10.632	11	1 43 3.93	1.8556	5 21 45.8	10.304
12	0 16 0.27	1.8667	2 55 47.6	10.640	12	1 44 55.29	1.8564	5 32 3.4	10.282
13	0 17 52.23	1.8653	2 45 9.0	10.647	13	1 46 46.70	1.8573	5 42 19.7	10.260
14	0 19 44.11	1.8640	2 34 30.0	10.654	14	1 48 38.17	1.8583	5 52 34.6	10.237
15	0 21 35.91	1.8627	2 23 50.5	10.661	15	1 50 29.70	1.8593	6 2 48.1	10.213
16	0 23 27.63	1.8615	2 13 10.7	10.666	16	1 52 21.29	1.8603	6 13 0.2	10.189
17	0 25 19.29	1.8604	2 2 30.6	10.670	17	1 54 12.94	1.8614	6 23 10.8	10.163
18	0 27 10.88	1.8593	1 51 50.3	10.673	18	1 56 4.66	1.8625	6 33 19.8	10.137
19	0 29 2.40	1.8582	1 41 9.8	10.677	19	1 57 56.44	1.8636	6 43 27.3	10.111
20	0 30 53.86	1.8572	1 30 29.1	10.680	20	1 59 48.29	1.8648	6 53 33.2	10.084
21	0 32 45.27	1.8563	1 19 48.2	10.682	21	2 1 40.22	1.8661	7 3 37.4	10.057
22	0 34 36.62	1.8554	1 9 7.2	10.683	22	2 3 32.23	1.8674	7 13 40.0	10.029
23	0 36 27.92	1.8545	0 58 26.2	10.684	23	2 5 24.31	1.8687	7 23 40.9	10.000
24	0 38 19.16	1.8537	S. 0 47 45.1	10.685	24	2 7 16.47	1.8700	N. 7 33 40.0	9.970

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 9.					FRIDAY 11.				
0	2 7 16.47	1.8700	N. 7 33 40.0	9.970	0	3 39 13.97	1.9735	N. 14 46 5.9	7.799
1	2 9 8.71	1.8714	7 43 37.3	9.940	1	3 41 12.40	1.9752	14 53 52.0	7.737
2	2 11 1.04	1.8729	7 53 32.8	9.910	2	3 43 11.00	1.9780	15 1 34.4	7.675
3	2 12 53.46	1.8743	8 3 26.5	9.878	3	3 45 9.76	1.9807	15 9 13.0	7.612
4	2 14 45.96	1.8758	8 13 18.2	9.846	4	3 47 8.68	1.9834	15 16 47.9	7.549
5	2 16 38.55	1.8773	8 23 8.0	9.813	5	3 49 7.77	1.9862	15 24 18.9	7.485
6	2 18 31.24	1.8789	8 32 55.8	9.780	6	3 51 7.03	1.9891	15 31 46.1	7.421
7	2 20 24.02	1.8805	8 42 41.6	9.746	7	3 53 6.46	1.9919	15 39 9.4	7.356
8	2 22 16.90	1.8822	8 52 25.3	9.711	8	3 55 6.06	1.9947	15 46 28.8	7.290
9	2 24 9.88	1.8839	9 2 6.9	9.676	9	3 57 5.82	1.9974	15 53 44.2	7.224
10	2 26 2.96	1.8856	9 11 46.4	9.641	10	3 59 5.75	2.0002	16 0 55.6	7.157
11	2 27 56.15	1.8873	9 21 23.8	9.605	11	4 1 5.85	2.0031	16 8 3.0	7.090
12	2 29 49.44	1.8891	9 30 59.0	9.567	12	4 3 6.13	2.0061	16 15 6.3	7.021
13	2 31 42.84	1.8909	9 40 31.9	9.529	13	4 5 6.58	2.0089	16 22 5.5	6.952
14	2 33 36.35	1.8928	9 50 2.5	9.491	14	4 7 7.20	2.0117	16 29 0.5	6.882
15	2 35 29.98	1.8947	9 59 30.8	9.452	15	4 9 7.99	2.0146	16 35 51.3	6.812
16	2 37 23.72	1.8966	10 8 56.7	9.412	16	4 11 8.95	2.0175	16 42 37.9	6.741
17	2 39 17.57	1.8985	10 18 20.2	9.372	17	4 13 10.09	2.0204	16 49 20.2	6.669
18	2 41 11.54	1.9005	10 27 41.3	9.331	18	4 15 11.40	2.0233	16 55 58.2	6.597
19	2 43 5.63	1.9025	10 36 59.9	9.289	19	4 17 12.88	2.0262	17 2 31.9	6.525
20	2 44 59.84	1.9046	10 46 16.0	9.246	20	4 19 14.54	2.0291	17 9 1.2	6.451
21	2 46 54.18	1.9067	10 55 29.5	9.203	21	4 21 16.37	2.0319	17 15 26.0	6.376
22	2 48 48.64	1.9088	11 4 40.4	9.160	22	4 23 18.37	2.0348	17 21 46.3	6.301
23	2 50 43.23	1.9109	N. 11 13 48.7	9.117	23	4 25 20.55	2.0377	N. 17 28 2.1	6.226
THURSDAY 10.					SATURDAY 12.				
0	2 52 37.95	1.9131	N. 11 22 54.4	9.072	0	4 27 22.90	2.0407	N. 17 34 13.4	6.150
1	2 54 32.80	1.9153	11 31 57.4	9.026	1	4 29 25.43	2.0436	17 40 20.1	6.074
2	2 56 27.78	1.9175	11 40 57.6	8.979	2	4 31 28.13	2.0464	17 46 22.2	5.997
3	2 58 22.90	1.9197	11 49 54.9	8.932	3	4 33 31.00	2.0493	17 52 19.7	5.919
4	3 0 18.15	1.9220	11 58 49.4	8.885	4	4 35 34.04	2.0522	17 58 12.5	5.841
5	3 2 13.54	1.9243	12 7 41.1	8.837	5	4 37 37.26	2.0551	18 4 0.6	5.762
6	3 4 9.07	1.9267	12 16 29.9	8.789	6	4 39 40.65	2.0579	18 9 43.9	5.682
7	3 6 4.74	1.9290	12 25 15.8	8.740	7	4 41 44.21	2.0608	18 15 22.4	5.602
8	3 8 0.55	1.9313	12 33 58.7	8.689	8	4 43 47.95	2.0637	18 20 56.1	5.521
9	3 9 56.50	1.9337	12 42 38.5	8.637	9	4 45 51.86	2.0666	18 26 24.9	5.439
10	3 11 52.60	1.9362	12 51 15.2	8.586	10	4 47 55.94	2.0694	18 31 48.8	5.358
11	3 13 48.85	1.9387	12 59 48.8	8.534	11	4 50 0.19	2.0723	18 37 7.8	5.276
12	3 15 45.24	1.9411	13 8 19.3	8.482	12	4 52 4.62	2.0752	18 42 21.9	5.192
13	3 17 41.78	1.9436	13 16 46.6	8.429	13	4 54 9.22	2.0780	18 47 30.9	5.108
14	3 19 38.47	1.9460	13 25 10.7	8.375	14	4 56 13.98	2.0808	18 52 34.9	5.024
15	3 21 35.32	1.9487	13 33 31.6	8.320	15	4 58 18.91	2.0836	18 57 33.8	4.939
16	3 23 32.32	1.9519	13 41 49.1	8.264	16	5 0 24.01	2.0863	19 2 27.6	4.853
17	3 25 29.47	1.9538	13 50 3.3	8.208	17	5 2 29.27	2.0891	19 7 16.2	4.768
18	3 27 26.78	1.9565	13 58 14.1	8.152	18	5 4 34.70	2.0919	19 11 59.7	4.682
19	3 29 24.25	1.9591	14 6 21.5	8.094	19	5 6 40.30	2.0947	19 16 38.0	4.594
20	3 31 21.87	1.9617	14 14 25.4	8.036	20	5 8 46.06	2.0974	19 21 11.0	4.506
21	3 33 19.65	1.9644	14 22 25.8	7.977	21	5 10 51.99	2.1001	19 25 38.7	4.417
22	3 35 17.59	1.9671	14 30 22.7	7.919	22	5 12 58.08	2.1028	19 30 1.1	4.329
23	3 37 15.70	1.9698	14 38 16.1	7.860	23	5 15 4.33	2.1056	19 34 18.2	4.240
24	3 39 13.97	1.9725	N. 14 46 5.9	7.799	24	5 17 10.75	2.1083	N. 19 38 29.9	4.150

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 13.					TUESDAY 15.				
0	h m s	s	N. 19° 38' 20.9"	4.150	0	h m s	s	N. 21° 5' 47.6"	0.650
1	5 17 17.33	2.1083	19 42 36.2	4.060	1	7 0 58.52	2.2046	21 5 5.4	0.757
2	5 21 24.06	2.1109	19 46 37.1	3.969	2	7 3 10.83	2.2058	21 4 16.7	0.865
3	5 23 30.95	2.1135	19 50 32.5	3.877	3	7 5 23.21	2.2069	21 3 21.6	0.972
4	5 25 38.00	2.1162	19 54 22.1	3.786	4	7 7 35.66	2.2080	21 2 20.1	1.079
5	5 27 45.20	2.1188	19 58 6.8	3.694	5	7 9 48.17	2.2090	21 1 12.1	1.187
6	5 29 52.56	2.1213	20 1 45.7	3.602	6	7 12 0.74	2.2100	20 59 57.7	1.294
7	5 32 0.07	2.1239	20 5 19.0	3.508	7	7 14 13.37	2.2110	20 58 36.8	1.402
8	5 34 7.73	2.1264	20 8 46.7	3.414	8	7 16 26.06	2.2119	20 57 9.4	1.510
9	5 36 15.54	2.1289	20 12 8.7	3.320	9	7 18 38.80	2.2128	20 55 35.6	1.618
10	5 38 23.50	2.1314	20 15 25.1	3.225	10	7 20 51.60	2.2137	20 53 55.3	1.726
11	5 40 31.61	2.1339	20 18 35.7	3.129	11	7 23 4.45	2.2146	20 52 8.5	1.834
12	5 42 39.86	2.1363	20 21 40.6	3.033	12	7 25 17.35	2.2154	20 50 15.2	1.942
13	5 44 48.25	2.1387	20 24 39.7	2.938	13	7 27 30.30	2.2162	20 48 15.4	2.051
14	5 46 56.79	2.1411	20 27 33.1	2.842	14	7 29 43.29	2.2169	20 46 9.1	2.159
15	5 49 5.47	2.1435	20 30 20.7	2.745	15	7 31 56.32	2.2176	20 43 56.3	2.267
16	5 51 14.39	2.1458	20 33 2.5	2.647	16	7 34 9.40	2.2182	20 41 37.1	2.374
17	5 53 23.24	2.1481	20 35 38.4	2.549	17	7 36 22.51	2.2188	20 39 11.4	2.482
18	5 55 32.33	2.1503	20 38 8.4	2.451	18	7 38 35.66	2.2194	20 36 39.2	2.591
19	5 57 41.55	2.1526	20 40 32.5	2.352	19	7 40 48.84	2.2199	20 34 0.5	2.699
20	5 59 50.91	2.1548	20 42 50.7	2.253	20	7 43 2.05	2.2204	20 31 15.3	2.807
21	6 2 0.40	2.1571	20 45 2.9	2.154	21	7 45 15.29	2.2209	20 28 23.6	2.916
22	6 4 10.01	2.1592	20 47 9.2	2.054	22	7 47 28.56	2.2214	20 25 25.4	3.023
23	6 6 19.75	2.1613	N. 20 49 9.4	1.953	23	7 49 41.86	2.2219	N. 20 22 20.8	3.131
MONDAY 14.					WEDNESDAY 16.				
0	6 8 29.62	2.1634	N. 20 51 3.6	1.853	0	7 54 8.54	2.2227	N. 20 19 9.7	3.239
1	6 10 39.61	2.1655	20 52 51.8	1.752	1	7 56 21.91	2.2229	20 15 52.1	3.347
2	6 12 49.72	2.1675	20 54 33.9	1.651	2	7 58 35.29	2.2232	20 12 28.0	3.455
3	6 14 59.95	2.1695	20 56 9.9	1.549	3	8 0 48.69	2.2234	20 8 57.5	3.562
4	6 17 10.29	2.1714	20 57 39.8	1.447	4	8 3 2.10	2.2237	20 5 20.5	3.670
5	6 19 20.75	2.1733	20 59 3.6	1.345	5	8 5 15.53	2.2239	20 1 37.1	3.777
6	6 21 31.33	2.1753	21 0 21.2	1.242	6	8 7 28.97	2.2241	19 57 47.3	3.884
7	6 23 42.02	2.1772	21 1 32.6	1.139	7	8 9 42.42	2.2242	19 53 51.0	3.991
8	6 25 52.81	2.1790	21 2 37.8	1.036	8	8 11 55.87	2.2243	19 49 48.3	4.098
9	6 28 3.71	2.1807	21 3 36.9	0.933	9	8 14 9.33	2.2244	19 45 39.2	4.205
10	6 30 14.71	2.1825	21 4 29.8	0.829	10	8 16 22.80	2.2245	19 41 23.7	4.312
11	6 32 25.81	2.1842	21 5 16.4	0.724	11	8 18 36.27	2.2245	19 37 1.8	4.418
12	6 34 37.02	2.1859	21 5 56.7	0.619	12	8 20 49.74	2.2245	19 32 33.5	4.524
13	6 36 48.32	2.1876	21 6 30.7	0.515	13	8 23 3.21	2.2245	19 27 58.9	4.630
14	6 38 59.72	2.1892	21 6 58.5	0.411	14	8 25 16.68	2.2244	19 23 17.9	4.737
15	6 41 11.22	2.1909	21 7 20.0	0.306	15	8 27 30.14	2.2243	19 18 30.5	4.843
16	6 43 22.81	2.1924	21 7 35.2	0.200	16	8 29 43.60	2.2242	19 13 36.8	4.948
17	6 45 34.48	2.1938	21 7 44.0	+ 0.094	17	8 31 57.05	2.2241	19 8 36.8	5.053
18	6 47 46.24	2.1953	21 7 46.5	- 0.012	18	8 34 10.49	2.2240	19 3 30.5	5.158
19	6 49 58.09	2.1968	21 7 42.6	0.117	19	8 36 23.93	2.2239	18 58 17.9	5.263
20	6 52 10.02	2.1982	21 7 32.4	0.223	20	8 38 37.36	2.2238	18 52 59.0	5.367
21	6 54 22.03	2.1995	21 7 15.8	0.330	21	8 40 50.78	2.2236	18 47 33.9	5.470
22	6 56 34.12	2.2008	21 6 52.8	0.437	22	8 43 4.19	2.2233	18 42 2.6	5.574
23	6 58 46.28	2.2021	21 6 23.4	0.543	23	8 45 17.58	2.2231	18 36 25.0	5.678
24	7 0 58.52	2.2033	N. 21 5 47.6	0.650	24	8 47 30.96	2.2228	N. 18 30 41.2	5.781

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 17.					SATURDAY 19.				
0	8 47 30.96	2.2238	N. 18° 30' 41.2"	5.781	0	10 33 48.26	2.2075	N. 12° 2' 10.7"	10.204
1	8 49 44.32	2.2226	18 24 51.3	5.884	1	10 36 0.71	2.2075	11 51 56.1	10.282
2	8 51 57.67	2.2223	18 18 55.2	5.987	2	10 38 13.16	2.2074	11 41 36.9	10.358
3	8 54 11.00	2.2220	18 12 52.9	6.089	3	10 40 25.60	2.2074	11 31 13.1	10.434
4	8 56 24.31	2.2217	18 6 44.5	6.191	4	10 42 38.05	2.2075	11 20 44.8	10.509
5	8 58 37.60	2.2213	18 0 30.0	6.292	5	10 44 50.50	2.2076	11 10 12.0	10.583
6	9 0 50.87	2.2210	17 54 9.4	6.393	6	10 47 2.96	2.2077	10 59 34.8	10.657
7	9 3 4.12	2.2207	17 47 42.8	6.494	7	10 49 15.42	2.2078	10 48 53.2	10.730
8	9 5 17.35	2.2203	17 41 10.1	6.595	8	10 51 27.89	2.2079	10 38 7.2	10.802
9	9 7 30.56	2.2200	17 34 31.4	6.696	9	10 53 40.37	2.2081	10 27 17.0	10.873
10	9 9 43.75	2.2196	17 27 46.7	6.795	10	10 55 52.86	2.2083	10 16 22.5	10.943
11	9 11 56.91	2.2192	17 20 56.0	6.895	11	10 58 5.37	2.2086	10 5 23.8	11.012
12	9 14 10.05	2.2188	17 13 59.3	6.994	12	11 0 17.89	2.2089	9 54 21.0	11.081
13	9 16 23.17	2.2184	17 6 56.7	7.092	13	11 2 30.43	2.2092	9 43 14.1	11.149
14	9 18 36.26	2.2180	16 59 48.3	7.189	14	11 4 42.99	2.2095	9 32 3.1	11.216
15	9 20 49.33	2.2176	16 52 34.0	7.287	15	11 6 55.57	2.2098	9 20 48.2	11.281
16	9 23 2.37	2.2172	16 45 13.8	7.385	16	11 9 8.17	2.2102	9 9 29.4	11.346
17	9 25 15.39	2.2168	16 37 47.8	7.481	17	11 11 20.80	2.2107	8 58 6.7	11.411
18	9 27 28.39	2.2164	16 30 16.1	7.577	18	11 13 33.46	2.2112	8 46 40.1	11.474
19	9 29 41.36	2.2160	16 22 38.6	7.672	19	11 15 46.15	2.2117	8 35 9.8	11.536
20	9 31 54.31	2.2156	16 14 55.4	7.768	20	11 17 58.87	2.2122	8 23 35.8	11.597
21	9 34 7.23	2.2152	16 7 6.4	7.863	21	11 20 11.62	2.2128	8 11 58.1	11.658
22	9 36 20.13	2.2147	15 59 11.8	7.958	22	11 22 24.41	2.2135	8 0 16.8	11.718
23	9 38 33.00	2.2143	N. 15° 51' 11.5"	8.052	23	11 24 37.24	2.2142	N. 7° 48' 31.9"	11.777
FRIDAY 18.					SUNDAY 20.				
0	9 40 45.85	2.2139	N. 15° 43' 5.6"	8.145	0	11 26 50.12	2.2150	N. 7° 36' 43.5"	11.835
1	9 42 58.67	2.2135	15 34 54.1	8.237	1	11 29 3.04	2.2157	7 24 51.7	11.891
2	9 45 11.47	2.2131	15 26 37.1	8.329	2	11 31 16.00	2.2164	7 12 56.0	11.946
3	9 47 24.25	2.2127	15 18 14.6	8.421	3	11 33 29.01	2.2172	7 0 58.2	12.001
4	9 49 37.00	2.2123	15 9 46.6	8.512	4	11 35 42.07	2.2181	6 48 56.5	12.055
5	9 51 49.73	2.2120	15 1 13.2	8.602	5	11 37 55.19	2.2191	6 36 51.6	12.107
6	9 54 2.44	2.2117	14 52 34.3	8.692	6	11 40 8.36	2.2200	6 24 43.6	12.158
7	9 56 15.13	2.2113	14 43 50.1	8.782	7	11 42 21.59	2.2211	6 12 32.6	12.208
8	9 58 27.80	2.2109	14 35 0.5	8.871	8	11 44 34.89	2.2222	6 0 18.6	12.258
9	10 0 40.44	2.2105	14 26 5.6	8.959	9	11 46 48.25	2.2233	5 48 1.6	12.307
10	10 2 53.06	2.2102	14 17 5.4	9.047	10	11 49 1.67	2.2244	5 35 41.7	12.355
11	10 5 5.67	2.2100	14 8 0.0	9.134	11	11 51 15.17	2.2256	5 23 19.0	12.401
12	10 7 18.26	2.2097	13 58 49.4	9.220	12	11 53 28.74	2.2268	5 10 53.6	12.446
13	10 9 30.83	2.2094	13 49 33.6	9.306	13	11 55 42.39	2.2281	4 58 25.5	12.490
14	10 11 43.38	2.2091	13 40 12.7	9.391	14	11 57 56.11	2.2294	4 45 54.8	12.532
15	10 13 55.92	2.2089	13 30 46.7	9.475	15	12 0 9.91	2.2307	4 33 21.6	12.574
16	10 16 8.45	2.2087	13 21 15.7	9.558	16	12 2 23.79	2.2321	4 20 45.9	12.615
17	10 18 20.96	2.2084	13 11 39.7	9.641	17	12 4 37.76	2.2336	4 8 7.8	12.654
18	10 20 33.46	2.2082	13 1 58.7	9.724	18	12 6 51.82	2.2351	3 55 27.4	12.692
19	10 22 45.95	2.2081	12 52 12.8	9.806	19	12 9 5.97	2.2366	3 42 44.7	12.730
20	10 24 58.43	2.2079	12 42 22.0	9.887	20	12 11 20.21	2.2382	3 29 59.8	12.766
21	10 27 10.89	2.2077	12 32 26.3	9.968	21	12 13 34.55	2.2399	3 17 12.8	12.800
22	10 29 23.35	2.2077	12 22 25.8	10.047	22	12 15 48.99	2.2416	3 4 23.8	12.832
23	10 31 35.81	2.2076	12 12 20.6	10.126	23	12 18 3.54	2.2433	2 51 32.9	12.864
24	10 33 48.26	2.2075	N. 12° 2' 10.7"	10.204	24	12 20 18.19	2.2451	N. 2° 38' 40.1"	12.896

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 21.					WEDNESDAY 23.				
0	12 20 18.19	2.2451	N. 2 38 40.1	12.896	0	14 11 0.92	2.3844	S. 7 49 35.3	12.697
1	12 22 32.95	2.2469	2 25 45.4	12.926	1	14 13 24.10	2.3882	8 2 15.9	12.654
2	12 24 47.82	2.2488	2 12 49.0	12.954	2	14 15 47.51	2.3921	8 14 53.8	12.609
3	12 27 2.80	2.2507	1 59 50.9	12.982	3	14 18 11.15	2.3960	8 27 29.0	12.562
4	12 29 17.00	2.2527	1 46 51.2	13.008	4	14 20 35.03	2.3999	8 40 1.3	12.513
5	12 31 33.12	2.2547	1 33 50.0	13.032	5	14 22 59.14	2.4038	8 52 30.6	12.463
6	12 33 48.47	2.2568	1 20 47.4	13.055	6	14 25 23.48	2.4077	9 4 56.9	12.412
7	12 36 3.94	2.2589	1 7 43.4	13.077	7	14 27 48.06	2.4117	9 17 20.0	12.358
8	12 38 19.54	2.2611	0 54 38.1	13.097	8	14 30 12.88	2.4157	9 29 39.8	12.303
9	12 40 35.27	2.2633	0 41 31.7	13.116	9	14 32 37.94	2.4197	9 41 56.3	12.246
10	12 42 51.14	2.2656	0 28 24.2	13.134	10	14 35 3.24	2.4237	9 54 9.3	12.187
11	12 45 7.15	2.2679	0 15 15.6	13.151	11	14 37 28.78	2.4276	10 6 18.7	12.126
12	12 47 23.29	2.2703	N. 0 2 6.1	13.166	12	14 39 54.55	2.4316	10 18 24.4	12.063
13	12 49 39.58	2.2727	S. 0 11 4.3	13.180	13	14 42 20.57	2.4357	10 30 26.3	11.999
14	12 51 56.01	2.2751	0 24 15.5	13.192	14	14 44 46.83	2.4397	10 42 24.3	11.934
15	12 54 12.59	2.2776	0 37 27.3	13.202	15	14 47 13.34	2.4438	10 54 18.4	11.867
16	12 56 29.32	2.2802	0 50 39.7	13.212	16	14 49 40.09	2.4478	11 6 8.3	11.797
17	12 58 46.21	2.2828	1 3 52.7	13.221	17	14 52 7.08	2.4518	11 17 54.0	11.726
18	13 1 3.26	2.2855	1 17 6.2	13.227	18	14 54 34.31	2.4559	11 29 35.4	11.653
19	13 3 20.47	2.2882	1 30 20.0	13.232	19	14 57 1.79	2.4600	11 41 12.4	11.579
20	13 5 37.84	2.2909	1 43 31.0	13.235	20	14 59 29.51	2.4640	11 52 44.9	11.502
21	13 7 55.37	2.2936	1 56 48.2	13.237	21	15 1 57.47	2.4680	12 4 12.7	11.424
22	13 10 13.07	2.2965	2 10 2.5	13.238	22	15 4 25.67	2.4720	12 15 35.8	11.345
23	13 12 30.95	2.2994	S. 2 23 16.8	13.237	23	15 6 54.11	2.4761	S. 12 26 54.1	11.264
TUESDAY 22.					THURSDAY 24.				
0	13 14 49.00	2.3023	S. 2 36 30.9	13.234	0	15 9 22.80	2.4801	S. 12 38 7.5	11.181
1	13 17 7.23	2.3053	2 49 44.8	13.230	1	15 11 51.73	2.4841	12 49 15.8	11.096
2	13 19 25.64	2.3082	3 2 58.5	13.226	2	15 14 20.89	2.4880	13 0 19.0	11.010
3	13 21 44.22	2.3112	3 16 11.9	13.219	3	15 16 50.29	2.4920	13 11 17.0	10.922
4	13 24 2.99	2.3144	3 29 24.8	13.210	4	15 19 19.93	2.4959	13 22 9.7	10.832
5	13 26 21.95	2.3176	3 42 37.1	13.199	5	15 21 49.80	2.4997	13 32 56.9	10.741
6	13 28 41.10	2.3208	3 55 48.7	13.187	6	15 24 19.90	2.5036	13 43 38.6	10.648
7	13 31 0.44	2.3240	4 8 59.6	13.174	7	15 26 50.23	2.5075	13 54 14.7	10.553
8	13 33 19.98	2.3273	4 22 9.6	13.159	8	15 29 20.80	2.5114	14 4 45.0	10.457
9	13 35 39.72	2.3306	4 35 18.7	13.143	9	15 31 51.60	2.5152	14 15 9.5	10.359
10	13 37 59.65	2.3339	4 48 26.8	13.125	10	15 34 22.63	2.5190	14 25 28.1	10.260
11	13 40 19.79	2.3373	5 1 33.7	13.105	11	15 36 53.88	2.5227	14 35 40.7	10.158
12	13 42 40.13	2.3407	5 14 39.4	13.084	12	15 39 25.36	2.5265	14 45 47.1	10.055
13	13 45 0.68	2.3442	5 27 43.8	13.061	13	15 41 57.06	2.5302	14 55 47.3	9.952
14	13 47 21.44	2.3477	5 40 46.7	13.036	14	15 44 28.98	2.5338	15 5 41.3	9.847
15	13 49 42.41	2.3512	5 53 48.1	13.010	15	15 47 1.11	2.5373	15 15 28.9	9.739
16	13 52 3.59	2.3547	6 6 47.9	12.982	16	15 49 33.46	2.5409	15 25 10.0	9.631
17	13 54 24.98	2.3583	6 19 45.9	12.952	17	15 52 6.62	2.5444	15 34 44.6	9.521
18	13 56 46.59	2.3620	6 32 42.1	12.921	18	15 54 38.79	2.5478	15 44 12.5	9.409
19	13 59 8.42	2.3657	6 45 36.4	12.888	19	15 57 11.76	2.5512	15 53 33.7	9.296
20	14 1 30.47	2.3694	6 58 28.6	12.853	20	15 59 44.93	2.5545	16 2 48.0	9.181
21	14 3 52.75	2.3731	7 11 18.7	12.817	21	16 2 18.30	2.5578	16 11 55.4	9.065
22	14 6 15.25	2.3768	7 24 6.6	12.779	22	16 4 51.87	2.5611	16 20 55.8	8.947
23	14 8 37.97	2.3806	7 36 52.2	12.739	23	16 7 25.64	2.5644	16 29 4.1	8.828
24	14 11 0.92	2.3844	S. 7 49 35.3	12.697	24	16 9 59.60	2.5675	S. 16 38 35.2	8.708



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 25.					SUNDAY 27.				
0	h m s 16 9 59.60	2.5675	S. 16° 38' 35.2"	8.708	0	h m s 18 15 10.70	2.6087	S. 20° 59' 2.6"	1.900
1	16 12 33.74	2.5705	16 47 14.1	8.587	1	18 17 47.17	2.6068	21 0 52.1	1.750
2	16 15 8.06	2.5734	16 55 45.7	8.464	2	18 20 23.52	2.6048	21 2 32.6	1.599
3	16 17 42.55	2.5763	17 4 9.8	8.340	3	18 22 59.75	2.6027	21 4 4.0	1.449
4	16 20 17.22	2.5791	17 12 26.5	8.216	4	18 25 35.85	2.6006	21 5 26.4	1.299
5	16 22 52.05	2.5819	17 20 35.7	8.089	5	18 28 11.82	2.5983	21 6 39.9	1.150
6	16 25 27.05	2.5847	17 28 37.2	7.961	6	18 30 47.65	2.5958	21 7 44.4	1.000
7	16 28 2.21	2.5873	17 36 31.0	7.832	7	18 33 23.32	2.5933	21 8 39.9	0.851
8	16 30 37.52	2.5898	17 44 17.1	7.702	8	18 35 58.84	2.5907	21 9 23.5	0.702
9	16 33 12.98	2.5923	17 51 55.3	7.571	9	18 38 34.20	2.5879	21 10 4.2	0.554
10	16 35 48.59	2.5946	17 59 25.6	7.439	10	18 41 9.39	2.5850	21 10 33.0	0.407
11	16 38 24.33	2.5969	18 6 48.0	7.306	11	18 43 44.40	2.5820	21 10 53.0	0.260
12	16 41 0.21	2.5991	18 14 2.3	7.171	12	18 46 19.23	2.5789	21 11 4.2	-0.113
13	16 43 36.22	2.6012	18 21 8.5	7.036	13	18 48 53.87	2.5757	21 11 6.6	+0.033
14	16 46 12.35	2.6032	18 28 6.6	6.900	14	18 51 28.31	2.5723	21 11 0.2	0.179
15	16 48 48.60	2.6052	18 34 56.5	6.762	15	18 54 2.55	2.5689	21 10 45.1	0.324
16	16 51 24.97	2.6071	18 41 38.1	6.624	16	18 56 36.58	2.5654	21 10 21.3	0.469
17	16 54 1.45	2.6088	18 48 11.4	6.484	17	18 59 10.40	2.5618	21 9 48.8	0.613
18	16 56 38.03	2.6104	18 54 36.2	6.343	18	19 1 44.00	2.5581	21 9 7.7	0.757
19	16 59 14.70	2.6119	19 0 52.6	6.203	19	19 4 17.37	2.5543	21 8 18.0	0.899
20	17 1 51.46	2.6134	19 7 0.5	6.062	20	19 6 50.51	2.5504	21 7 19.8	1.040
21	17 4 28.31	2.6147	19 13 0.0	5.920	21	19 9 23.42	2.5464	21 6 13.2	1.181
22	17 7 5.23	2.6159	19 18 50.9	5.777	22	19 11 56.08	2.5422	21 4 58.1	1.322
23	17 9 42.22	2.6171	S. 19° 24' 33.2"	5.632	23	19 14 28.49	2.5380	S. 21° 3' 34.6"	1.461
SATURDAY 26.					MONDAY 28.				
0	17 12 19.28	2.6182	S. 19° 30' 6.8"	5.487	0	19 17 0.64	2.5337	S. 21° 2' 2.8"	1.599
1	17 14 56.40	2.6191	19 35 31.7	5.342	1	19 19 32.54	2.5294	21 0 22.7	1.737
2	17 17 33.57	2.6198	19 40 47.9	5.197	2	19 22 4.17	2.5249	20 58 34.3	1.875
3	17 20 10.78	2.6205	19 45 55.3	5.050	3	19 24 35.53	2.5204	20 56 37.7	2.011
4	17 22 48.03	2.6212	19 50 53.9	4.902	4	19 27 6.62	2.5158	20 54 33.0	2.147
5	17 25 25.32	2.6217	19 55 43.6	4.755	5	19 29 37.43	2.5112	20 52 20.1	2.282
6	17 28 2.64	2.6221	20 0 24.5	4.607	6	19 32 7.96	2.5064	20 49 59.2	2.415
7	17 30 39.97	2.6223	20 4 56.5	4.459	7	19 34 38.20	2.5015	20 47 30.3	2.547
8	17 33 17.31	2.6224	20 9 19.6	4.310	8	19 37 8.14	2.4966	20 44 53.5	2.678
9	17 35 54.66	2.6224	20 13 33.7	4.160	9	19 39 37.79	2.4917	20 42 8.9	2.808
10	17 38 32.00	2.6223	20 17 38.8	4.011	10	19 42 7.14	2.4866	20 39 16.5	2.938
11	17 41 9.34	2.6221	20 21 35.0	3.862	11	19 44 36.18	2.4814	20 36 16.3	3.068
12	17 43 46.68	2.6218	20 25 22.2	3.712	12	19 47 4.90	2.4761	20 33 8.2	3.197
13	17 46 23.96	2.6214	20 29 0.4	3.561	13	19 49 33.31	2.4709	20 29 52.7	3.323
14	17 49 1.23	2.6208	20 32 29.5	3.410	14	19 52 1.41	2.4656	20 26 29.6	3.448
15	17 51 38.46	2.6201	20 35 49.6	3.259	15	19 54 29.19	2.4602	20 22 59.0	3.573
16	17 54 15.64	2.6193	20 39 0.6	3.108	16	19 56 56.64	2.4548	20 19 20.9	3.696
17	17 56 52.78	2.6185	20 42 2.6	2.957	17	19 59 23.77	2.4494	20 15 35.5	3.818
18	17 59 29.86	2.6174	20 44 55.5	2.806	18	20 1 50.57	2.4438	20 11 42.8	3.939
19	18 2 6.87	2.6162	20 47 39.3	2.655	19	20 4 17.03	2.4382	20 7 42.8	4.060
20	18 4 43.81	2.6150	20 50 14.1	2.504	20	20 6 43.16	2.4326	20 3 35.6	4.178
21	18 7 20.67	2.6136	20 52 39.8	2.353	21	20 9 8.95	2.4269	19 59 21.4	4.296
22	18 9 57.44	2.6121	20 54 56.5	2.202	22	20 11 34.39	2.4212	19 55 0.1	4.413
23	18 12 34.12	2.6105	20 57 4.1	2.051	23	20 13 59.49	2.4154	19 50 31.8	4.529
24	18 15 10.70	2.6087	S. 20° 59' 2.6"	1.900	24	20 16 24.24	2.4096	S. 19° 45' 56.6"	4.644



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
1	Spica W.	90 59 0	2507	92 40 3	2526	94 20 40	2544	96 0 52	2563
	JUPITER W.	49 13 41	2453	50 56 0	2471	52 37 54	2488	54 19 24	2506
	Antares W.	45 19 37	2574	46 59 8	2587	48 38 21	2600	50 17 13	2614
	Fomalhaut E.	44 5 25	3009	42 35 24	3064	41 6 30	3122	39 38 47	3184
	α Pegasi E.	60 16 55	2979	58 46 16	3016	57 16 23	3054	55 47 17	3095
	VENUS E.	89 12 6	2894	87 39 40	2915	86 7 40	2934	84 36 4	2964
	SUN E.	108 16 17	2817	106 42 11	2836	105 8 30	2855	103 35 14	2874
2	JUPITER W.	62 40 54	2590	64 20 3	2606	65 58 50	2623	67 37 14	2639
	Antares W.	58 27 3	2686	60 4 2	2701	61 40 41	2715	63 17 1	2730
	α Pegasi E.	48 34 47	3329	47 11 9	3386	45 48 36	3445	44 27 10	3509
	VENUS E.	77 4 16	3051	75 35 6	3069	74 6 19	3088	72 37 55	3106
	SUN E.	95 54 55	2967	94 24 1	2985	92 53 30	3004	91 23 22	3021
3	JUPITER W.	75 43 58	2715	77 20 18	2729	78 56 19	2743	80 32 2	2756
	Antares W.	71 13 54	2801	72 48 21	2814	74 22 31	2828	75 56 23	2841
	α Aquilæ W.	35 44 49	5127	36 40 6	4962	37 37 31	4817	38 36 53	4691
	VENUS E.	65 21 19	3193	63 55 2	3210	62 29 5	3225	61 3 26	3242
	SUN E.	83 58 0	3105	82 29 57	3121	81 2 13	3137	79 34 48	3152
4	JUPITER W.	88 26 15	2821	90 0 16	2832	91 34 2	2844	93 7 33	2855
	Antares W.	83 41 33	2903	85 13 48	2915	86 45 48	2927	88 17 33	2938
	α Aquilæ W.	43 57 4	4243	45 4 50	4180	46 13 35	4125	47 23 13	4075
	VENUS E.	53 59 45	3316	52 35 52	3330	51 12 15	3343	49 48 53	3357
	SUN E.	72 22 9	3223	70 56 27	3236	69 31 1	3249	68 5 50	3261
5	α Aquilæ W.	53 22 4	3892	54 35 32	3865	55 49 27	3841	57 3 47	3820
	VENUS E.	42 55 42	3416	41 33 44	3428	40 11 59	3439	38 50 27	3450
	SUN E.	61 3 26	3319	59 39 36	3330	58 15 50	3339	56 52 33	3350
6	α Aquilæ W.	63 20 21	3739	64 36 27	3727	65 52 45	3716	67 9 15	3707
	Fomalhaut W.	29 6 24	4179	30 15 10	4084	31 25 27	4002	32 37 5	3928
	VENUS E.	32 5 40	3500	30 45 16	3509	29 25 2	3519	28 4 59	3530
	SUN E.	49 58 7	3394	48 35 44	3402	47 13 30	3409	45 51 24	3416
7	α Aquilæ W.	73 33 55	3673	74 51 11	3668	76 8 32	3663	77 25 58	3660
	Fomalhaut W.	38 50 54	3679	40 8 3	3645	41 25 49	3614	42 44 8	3587
	SUN E.	39 3 1	3453	37 41 41	3460	36 20 35	3467	34 59 34	3473
8	α Aquilæ W.	83 53 52	3650	85 11 32	3650	86 29 12	3650	87 46 52	3650
	Fomalhaut W.	49 22 17	3485	50 42 58	3469	52 3 57	3454	53 25 12	3442
	SUN E.	28 16 27	3512	26 56 16	3520	25 36 14	3530	24 16 23	3542
12	SUN W.	16 17 44	3587	17 36 33	3557	18 55 54	3532	20 15 43	3509
	Pollux E.	44 58 59	3114	43 31 6	3114	42 3 14	3116	40 35 24	3118
	SATURN E.	53 24 27	3060	51 55 29	3057	50 26 27	3053	48 57 20	3048
	Regulus E.	80 24 33	3036	78 55 5	3032	77 25 32	3028	75 55 54	3024
13	SUN W.	27 0 0	3433	28 21 39	3421	29 43 32	3408	31 5 39	3397
	Pollux E.	33 16 51	3134	31 49 23	3140	30 22 2	3148	28 54 51	3158
	SATURN E.	41 30 18	3024	40 0 35	3019	38 30 46	3014	37 0 50	3008
	Regulus E.	68 26 20	3000	66 56 7	2994	65 25 47	2989	63 55 20	2982

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
1	Spica W.	97° 40' 38"	2581	99° 19' 59"	2599	100° 58' 56"	2616	102° 37' 29"	2630
	JUPITER W.	56 0 29	2523	57 41 10	2540	59 21 28	2557	61 1 22	2573
	Antares W.	51 55 52	2628	53 34 9	2642	55 12 7	2657	56 49 45	2672
	Fomalhaut E.	38 12 19	3253	36 47 12	3328	35 23 33	3411	34 1 29	3502
	α Pegasi E.	54 19 1	3137	52 51 36	3180	51 25 3	3227	49 59 26	3276
	VENUS E.	83 4 53	2973	81 34 7	2993	80 3 46	3013	78 33 49	3032
	SUN E.	102 2 22	2894	100 29 55	2912	98 57 52	2931	97 26 12	2949
2	JUPITER W.	69 15 16	2654	70 52 57	2669	72 30 18	2685	74 7 18	2700
	Antares W.	64 53 1	2744	66 28 42	2758	68 4 5	2772	69 39 9	2787
	α Pegasi E.	43 6 56	3578	41 47 58	3652	40 30 20	3732	39 14 7	3820
	VENUS E.	71 9 53	3124	69 42 13	3142	68 14 54	3159	66 47 56	3177
	SUN E.	89 53 35	3039	88 24 10	3056	86 55 6	3073	85 26 23	3089
3	JUPITER W.	82 7 27	2770	83 42 34	2783	85 17 24	2795	86 51 58	2808
	Antares W.	77 29 58	2854	79 3 16	2866	80 36 18	2880	82 9 3	2891
	α Aquilæ W.	39 38 0	4579	40 40 43	4479	41 44 54	4391	42 50 23	4313
	VENUS E.	59 38 6	3257	58 13 4	3272	56 48 20	3288	55 23 54	3302
	SUN E.	78 7 41	3167	76 40 52	3182	75 14 21	3196	73 48 7	3209
4	JUPITER W.	94 40 50	2866	96 13 53	2876	97 46 43	2886	99 19 20	2895
	Antares W.	89 49 4	2949	91 20 21	2959	92 51 25	2969	94 22 16	2979
	α Aquilæ W.	48 33 39	4030	49 44 49	3989	50 56 39	3953	52 9 5	3920
	VENUS E.	48 25 47	3369	47 2 55	3381	45 40 17	3393	44 17 53	3405
	SUN E.	66 40 53	3274	65 16 11	3286	63 51 43	3297	62 27 28	3308
5	α Aquilæ W.	58 18 29	3800	59 33 31	3782	60 48 52	3767	62 4 29	3752
	VENUS E.	37 29 7	3460	36 7 58	3471	34 47 1	3480	33 26 15	3490
	SUN E.	55 29 19	3359	54 6 16	3368	52 43 23	3377	51 20 40	3386
6	α Aquilæ W.	68 55 55	3698	69 42 41	3691	70 59 41	3684	72 16 45	3678
	Fomalhaut W.	33 49 56	3665	35 3 51	3810	36 18 43	3761	37 34 26	3718
	VENUS E.	26 45 8	3540	25 25 28	3550	24 5 59	3561	22 46 42	3561
	SUN E.	44 29 26	3424	43 7 37	3432	41 45 57	3439	40 24 25	3446
7	α Aquilæ W.	78 43 28	3657	80 1 1	3655	81 18 36	3653	82 36 13	3651
	Fomalhaut W.	44 2 57	3562	45 22 13	3540	46 41 53	3520	48 1 55	3502
	SUN E.	33 38 40	3480	32 17 54	3488	30 57 16	3496	29 36 47	3504
8	α Aquilæ W.	89 4 32	3651	90 22 11	3652	91 39 49	3654	92 57 25	3657
	Fomalhaut W.	54 46 41	3430	56 8 24	3419	57 30 19	3408	58 52 26	3400
	SUN E.	22 56 45	3555	21 37 21	3569	20 18 13	3587	18 59 24	3609
12	SUN W.	21 35 57	3490	22 56 32	3474	24 17 25	3459	25 38 35	3446
	Pollux E.	39 7 36	3119	37 39 50	3121	36 12 6	3124	34 44 26	3129
	SATURN E.	47 28 7	3043	45 58 48	3039	44 29 24	3034	42 59 54	3030
	Regulus E.	74 26 11	3020	72 56 23	3014	71 26 28	3009	69 56 27	3005
13	SUN W.	32 27 59	3386	33 50 31	3377	35 13 11	3366	36 36 9	3356
	Pollux E.	27 27 52	3171	25 1 8	3188	24 31 14	3209	23 8 45	3235
	SATURN E.	35 30 47	3001	34 0 36	2996	32 30 18	2989	30 59 51	2982
	Regulus E.	62 24 45	2977	60 54 3	2970	59 23 13	2964	57 52 15	2958

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIb.	P. L. of Diff.	VIb.	P. L. of Diff.	IXb.	P. L. of Diff.
14	SUN	W.	37 59 16	3345	39 22 35	3336	40 46 5	3325	42 9 47	3316
	SATURN	E.	29 29 16	2975	27 58 32	2969	26 27 40	2962	24 56 39	2954
	Regulus	E.	56 21 9	2950	54 49 51	2943	53 18 30	2936	51 46 57	2929
15	SUN	W.	49 11 16	3263	50 36 11	3252	52 1 19	3240	53 26 41	3228
	Regulus	E.	44 6 43	2887	42 34 8	2879	41 1 22	2869	39 28 24	2859
	MARS	E.	88 3 4	2862	86 29 56	2854	84 56 38	2845	83 23 9	2836
	Spica	E.	98 0 45	2916	96 28 47	2907	94 56 37	2898	93 24 15	2887
16	SUN	W.	60 36 59	3168	62 3 46	3156	63 30 48	3142	64 58 7	3129
	Regulus	E.	31 40 25	2810	30 6 10	2799	28 31 41	2788	26 56 58	2778
	MARS	E.	75 32 41	2788	73 57 57	2777	72 22 59	2766	70 47 47	2756
	Spica	E.	85 39 10	2835	84 5 28	2825	82 31 32	2813	80 57 21	2801
17	SUN	W.	72 18 49	3058	73 47 50	3043	75 17 9	3028	76 46 47	3014
	MARS	E.	62 48 6	2697	61 11 22	2685	59 34 22	2673	57 57 6	2660
	Spica	E.	73 2 33	2741	71 26 47	2728	69 50 44	2715	68 14 24	2702
18	SUN	W.	84 19 45	2933	85 51 22	2917	87 23 19	2901	88 55 37	2883
	Pollux	W.	30 53 33	2733	32 29 29	2706	34 6 1	2680	35 43 8	2655
	SATURN	W.	20 39 40	2618	22 18 10	2604	23 57 0	2588	25 36 12	2572
	MARS	E.	49 46 24	2594	48 7 22	2581	46 28 1	2567	44 48 21	2554
	Spica	E.	60 8 19	2635	58 30 11	2621	56 51 45	2608	55 13 1	2594
	JUPITER	E.	99 40 42	2557	98 0 48	2542	96 20 33	2527	94 39 57	2511
19	SUN	W.	96 42 37	2798	98 17 8	2780	99 52 2	2763	101 27 19	2744
	Pollux	W.	43 56 45	2543	45 36 59	2522	47 17 41	2502	48 58 52	2488
	SATURN	W.	33 57 41	2492	35 39 6	2475	37 20 55	2458	39 3 7	2442
	MARS	E.	36 25 24	2488	34 43 54	2475	33 2 6	2463	31 20 1	2452
	Spica	E.	46 54 43	2528	45 14 9	2516	43 33 18	2504	41 52 11	2493
	JUPITER	E.	86 11 28	2432	84 28 39	2416	82 45 27	2400	81 1 52	2384
	Antares	E.	92 48 33	2515	91 7 40	2498	89 26 24	2482	87 44 45	2465
20	SUN	W.	109 29 34	2657	111 7 11	2640	112 45 11	2624	114 23 34	2607
	Pollux	W.	57 31 39	2387	59 15 32	2368	60 59 52	2350	62 44 38	2333
	SATURN	W.	47 39 58	2359	49 24 31	2344	51 9 27	2327	52 54 47	2311
	Regulus	W.	21 20 30	2348	23 5 20	2330	24 50 36	2312	26 36 18	2294
	Spica	E.	33 22 57	2450	31 40 33	2445	29 58 3	2443	28 15 30	2445
	JUPITER	E.	72 18 8	2303	70 32 13	2287	68 45 55	2272	66 59 14	2256
	Antares	E.	79 10 50	2386	77 26 55	2371	75 42 38	2355	73 57 59	2339
21	SUN	W.	122 41 10	2526	124 21 47	2511	126 2 45	2496	127 44 4	2481
	Pollux	W.	71 34 42	2250	73 21 55	2235	75 9 31	2219	76 57 30	2204
	SATURN	W.	61 47 18	2233	63 34 56	2218	65 22 56	2204	67 11 18	2189
	Regulus	W.	35 31 1	2214	37 19 8	2198	39 7 38	2183	40 56 31	2169
	JUPITER	E.	58 0 4	2181	56 11 8	2167	54 21 50	2153	52 32 11	2139
	Antares	E.	65 9 20	2269	63 22 35	2257	61 35 32	2245	59 48 11	2233
22	Pollux	W.	86 2 43	2137	87 52 45	2126	89 43 4	2115	91 33 40	2104
	SATURN	W.	76 18 18	2124	78 8 40	2113	79 59 20	2101	81 50 17	2091
	Regulus	W.	50 6 11	2103	51 57 6	2090	53 48 20	2079	55 39 51	2069
	JUPITER	E.	43 19 6	2079	41 27 35	2070	39 35 49	2060	37 43 48	2051

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## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIb.	P. L. of Diff.	XXIb.	P. L. of Diff.
14	SUN	W.	43 33 40	3306	44 57 45	3294	46 22 3	3284	47 46 33	3273
	SATURN	E.	23 25 28	2946	21 54 8	2739	20 22 38	2930	18 50 57	2991
	Regulus	E.	50 15 15	2921	48 43 23	2912	47 11 20	2905	45 39 7	2896
15	SUN	W.	54 52 17	3217	56 18 6	3205	57 44 9	3193	59 10 27	3181
	Regulus	E.	37 55 13	2850	36 21 50	2841	34 48 15	2831	33 14 27	2820
	MARS	E.	81 49 28	2827	80 15 35	2818	78 41 30	2808	77 7 12	2798
	Spica	E.	91 51 40	2878	90 18 53	2867	88 45 52	2857	87 12 38	2846
16	SUN	W.	66 25 42	3115	67 53 33	3101	69 21 41	3087	70 50 6	3073
	Regulus	E.	25 22 1	2767	23 46 50	2756	22 11 24	2745	20 35 44	2735
	MARS	E.	69 12 21	2744	67 36 40	2733	66 0 44	2722	64 24 33	2710
	Spica	E.	79 22 55	2789	77 48 13	2778	76 13 16	2766	74 38 3	2753
17	SUN	W.	78 16 43	2998	79 46 58	2982	81 17 33	2965	82 48 29	2950
	MARS	E.	56 19 33	2647	54 41 42	2635	53 3 34	2621	51 25 8	2608
	Spica	E.	66 37 47	2689	65 0 52	2675	63 23 39	2662	61 46 8	2649
18	SUN	W.	90 28 17	2866	92 1 19	2849	93 34 43	2832	95 8 29	2815
	Pollux	W.	37 20 49	2631	38 59 2	2608	40 37 46	2586	42 17 0	2564
	SATURN	W.	27 15 45	2556	28 55 40	2540	30 35 58	2524	32 16 38	2507
	MARS	E.	43 8 23	2540	41 28 6	2527	39 47 30	2514	38 6 36	2501
	Spica	E.	53 33 58	2581	51 54 37	2567	50 14 57	2554	48 34 59	2541
	JUPITER	E.	92 58 59	2496	91 17 40	2480	89 35 59	2464	87 53 55	2448
19	SUN	W.	103 3 0	2727	104 39 4	2710	106 15 31	2692	107 52 21	2675
	Pollux	W.	50 40 31	2462	52 22 37	2443	54 5 11	2424	55 48 12	2405
	SATURN	W.	40 45 42	2425	42 28 41	2409	44 12 3	2392	45 55 49	2376
	MARS	E.	29 37 40	2441	27 55 4	2431	26 12 14	2424	24 29 13	2417
	Spica	E.	40 10 48	2482	38 29 10	2472	36 47 18	2463	35 5 13	2455
	JUPITER	E.	79 17 54	2368	77 33 33	2351	75 48 48	2335	74 3 40	2319
	Antares	E.	86 2 44	2450	84 20 20	2433	82 37 33	2417	80 54 23	2401
20	SUN	W.	116 2 23	2590	117 41 29	2574	119 21 0	2557	121 0 54	2541
	Pollux	W.	64 29 49	2316	66 15 25	2299	68 1 26	2282	69 47 52	2266
	SATURN	W.	54 40 31	2294	56 26 39	2279	58 13 10	2264	60 0 3	2249
	Regulus	W.	28 22 26	2277	30 8 59	2261	31 55 56	2245	33 43 17	2229
	Spica	E.	26 32 59	2450	24 50 36	2461	23 8 28	2478	21 26 44	2504
	JUPITER	E.	65 12 9	2240	63 24 41	2225	61 36 51	2210	59 48 38	2196
	Antares	E.	72 12 57	2325	70 27 34	2311	68 41 50	2296	66 55 45	2283
21	SUN	W.	129 25 44	2467	131 7 43	2454	132 50 1	2442	134 32 36	2430
	Pollux	W.	78 45 51	2190	80 34 34	2176	82 23 37	2163	84 13 0	2150
	SATURN	W.	69 0 2	2176	70 49 6	2163	72 38 30	2149	74 28 14	2136
	Regulus	W.	42 45 46	2155	44 35 22	2141	46 25 18	2128	48 15 35	2115
	JUPITER	E.	50 42 12	2127	48 51 54	2114	47 1 16	2102	45 10 20	2090
	Antares	E.	58 0 32	2222	56 12 37	2211	54 24 26	2202	52 36 1	2193
22	Pollux	W.	93 24 33	2094	95 15 41	2085	97 7 3	2076	98 58 39	2068
	SATURN	W.	83 41 30	2081	85 32 58	2072	87 24 41	2062	89 16 39	2053
	Regulus	W.	57 31 38	2059	59 23 41	2049	61 15 59	2040	63 8 31	2032
	JUPITER	E.	35 51 33	2043	33 59 6	2036	32 6 28	2030	30 13 41	2026

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## LUNAR DISTANCES.

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22	Antares	E.	50° 47' 23"	2186	48° 58' 34"	2178	47° 9' 34"	2173	45° 20' 26"	2169
23	Regulus	W.	65 1 16	2024	66 54 13	2017	68 47 21	2010	70 40 39	2005
	MARS	W.	21 44 51	2108	23 35 38	2090	25 26 53	2075	27 18 31	2062
	Antares	E.	36 13 56	2174	34 24 50	2182	32 35 56	2194	30 47 19	2210
	α Aquilæ	E.	84 52 51	2610	83 14 10	2607	81 35 25	2607	79 56 40	2609
24	Regulus	W.	80 9 3	1987	82 2 58	1986	83 56 55	1985	85 50 53	1986
	MARS	W.	36 40 36	2026	38 33 30	2022	40 26 30	2020	42 19 33	2019
	Spica	W.	27 1 11	2139	28 51 10	2120	30 41 38	2105	32 32 29	2093
	α Aquilæ	E.	71 44 22	2650	70 6 33	2663	68 29 4	2681	66 51 58	2701
25	Regulus	W.	95 20 12	1998	97 13 49	2003	99 7 19	2009	101 0 40	2015
	MARS	W.	51 44 45	2028	53 37 36	2032	55 30 21	2037	57 22 58	2043
	Spica	W.	41 50 4	2068	43 41 52	2068	45 33 40	2070	47 25 26	2072
	α Aquilæ	E.	58 54 41	2654	57 21 23	2696	55 48 59	2642	54 17 34	2695
	Fomalhaut	E.	90 16 43	2227	88 28 55	2232	86 41 15	2238	84 53 44	2246
26	MARS	W.	66 43 12	2086	68 34 33	2096	70 25 38	2108	72 16 25	2120
	Spica	W.	56 42 41	2101	58 33 38	2110	60 24 22	2120	62 14 51	2130
	JUPITER	W.	17 57 48	2096	19 48 53	2093	21 40 3	2094	23 31 11	2098
	Fomalhaut	E.	75 59 36	2302	74 13 40	2317	72 28 6	2334	70 42 56	2351
27	MARS	W.	81 25 29	2189	83 14 13	2204	85 2 31	2220	86 50 31	2237
	Spica	W.	71 22 58	2192	73 11 37	2206	74 59 55	2221	76 47 51	2237
	JUPITER	W.	32 44 20	2144	34 34 12	2157	36 23 44	2170	38 12 56	2184
	Antares	W.	26 15 38	2403	27 59 8	2391	29 42 56	2384	31 26 54	2381
	Fomalhaut	E.	62 4 4	2460	60 21 55	2446	58 40 22	2514	56 59 28	2544
	α Pegasi	E.	78 14 15	2545	76 34 4	2566	74 54 22	2588	73 15 11	2612
28	Spica	W.	85 41 33	2320	87 27 3	2338	89 12 7	2356	90 56 45	2374
	JUPITER	W.	47 13 23	2263	49 0 17	2280	50 46 46	2297	52 32 50	2315
	Antares	W.	40 6 27	2405	41 49 55	2415	43 33 9	2425	45 16 8	2438
	Fomalhaut	E.	48 46 4	2722	47 9 54	2766	45 34 42	2813	44 0 31	2863
	α Pegasi	E.	65 7 53	2751	63 32 21	2784	61 57 32	2818	60 23 27	2853
29	JUPITER	W.	61 16 40	2405	63 0 8	2424	64 43 9	2442	66 25 44	2460
	Antares	W.	53 46 18	2510	55 27 18	2525	57 7 56	2542	58 48 11	2559
	α Pegasi	E.	52 45 20	2685	51 16 27	2714	49 48 35	2768	48 21 47	2824
	α Arietis	E.	94 11 6	2587	92 31 53	2605	90 53 5	2624	89 14 42	2643
	SUN	E.	126 38 19	2767	125 3 8	2787	123 28 23	2807	121 54 4	2826
30	JUPITER	W.	74 52 10	2552	76 32 11	2570	78 11 47	2588	79 50 58	2606
	Antares	W.	67 3 43	2643	68 41 40	2660	70 19 14	2676	71 56 26	2693
	α Arietis	E.	81 9 20	2741	79 33 34	2761	77 58 15	2781	76 23 22	2801
	SUN	E.	114 8 47	2924	112 36 59	2943	111 5 35	2963	109 34 36	2981
31	JUPITER	W.	88 0 58	2691	89 37 50	2707	91 14 20	2724	92 50 28	2739
	Antares	W.	79 56 48	2775	81 31 48	2792	83 6 26	2808	84 40 44	2824
	α Aquilæ	W.	41 29 28	4342	42 35 42	4262	43 43 10	4191	44 51 45	4128
	α Arietis	E.	68 35 32	2903	67 3 17	2924	65 31 29	2945	64 0 7	2966
	SUN	E.	102 5 30	3074	100 36 49	3091	99 8 28	3108	97 40 28	3125

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## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	Antares	E.	43 31 11	2166	41 41 52	2165	39 52 31	2165	38 3 11	2169
23	Regulus	W.	72 34 6	2000	74 27 41	1995	76 21 23	1991	78 15 11	1989
	MARS	W.	29 10 29	2052	31 2 43	2043	32 55 10	2035	34 47 49	2030
	Antares	E.	28 59 6	2231	27 11 25	2260	25 24 26	2226	23 38 20	2244
	α Aquilæ	E.	78 17 57	2612	76 39 19	2618	75 0 48	2626	73 22 28	2636
24	Regulus	W.	87 44 50	1986	89 38 46	1988	91 32 39	1931	93 26 28	1924
	MARS	W.	44 12 38	2019	46 5 43	2019	47 58 47	2021	49 51 48	2024
	Spica	W.	34 23 39	2084	36 15 3	2077	38 6 37	2073	39 58 18	2070
	α Aquilæ	E.	65 15 19	2725	63 39 12	2751	62 3 40	2782	60 28 48	2816
25	Regulus	W.	102 53 51	2022	104 46 51	2030	106 39 39	2039	108 32 13	2048
	MARS	W.	59 15 25	2050	61 7 41	2058	62 59 45	2066	64 51 36	2076
	Spica	W.	49 17 8	2076	51 8 44	2081	53 0 13	2087	54 51 32	2094
	α Aquilæ	E.	52 47 15	2053	51 18 8	2118	49 50 20	2188	48 23 57	2268
	Fomalhaut	E.	83 6 25	2255	81 19 19	2264	79 32 27	2276	77 45 52	2289
26	MARS	W.	74 6 54	2133	75 57 3	2145	77 46 53	2159	79 36 22	2174
	Spica	W.	64 5 4	2141	65 55 1	2153	67 44 40	2166	69 33 59	2179
	JUPITER	W.	25 22 13	2105	27 13 5	2113	29 3 45	2122	30 54 11	2133
	Fomalhaut	E.	68 58 11	2370	67 13 53	2391	65 30 5	2412	63 46 48	2436
27	MARS	W.	88 38 4	2253	90 25 12	2271	92 11 54	2289	93 58 10	2307
	Spica	W.	78 35 23	2253	80 22 31	2269	82 9 16	2285	83 55 37	2302
	JUPITER	W.	40 1 47	2199	41 50 16	2214	43 38 22	2230	45 26 5	2247
	Antares	W.	33 10 56	2381	31 54 58	2384	36 38 56	2389	38 22 47	2396
	Fomalhaut	E.	55 19 16	2575	53 39 47	2608	52 1 3	2644	50 23 8	2682
	α Pegasi	E.	71 36 32	2637	69 58 27	2663	68 20 58	2691	66 44 6	2720
28	Spica	W.	92 40 57	2393	94 24 42	2412	96 8 0	2431	97 50 51	2449
	JUPITER	W.	54 18 28	2332	56 3 40	2350	57 48 26	2368	59 32 46	2387
	Antares	W.	46 58 49	2450	48 41 12	2465	50 23 15	2480	52 4 57	2494
	Fomalhaut	E.	42 27 25	2918	40 55 29	2977	39 24 47	3042	37 55 26	3112
	α Pegasi	E.	58 50 8	2891	57 17 38	2931	55 45 58	2973	54 15 11	3018
29	JUPITER	W.	68 7 53	2479	69 49 36	2497	71 30 53	2516	73 11 44	2534
	Antares	W.	60 28 3	2574	62 7 33	2591	63 46 40	2609	65 25 23	2626
	α Pegasi	E.	46 56 6	3285	45 31 37	3350	44 8 23	3420	42 46 29	3496
	α Arietis	E.	87 36 45	2662	85 59 14	2682	84 22 10	2701	82 45 32	2721
	SUN	E.	120 20 10	2845	118 46 41	2866	117 13 38	2885	115 41 0	2905
30	JUPITER	W.	81 29 45	2624	83 8 8	2640	84 46 8	2658	86 23 44	2675
	Antares	W.	73 33 15	2710	75 9 41	2727	76 45 45	2744	78 21 27	2760
	α Arietis	E.	74 48 55	2821	73 14 55	2842	71 41 21	2862	70 8 13	2883
	SUN	E.	108 4 0	3001	106 33 48	3019	105 3 59	3038	103 34 33	3056
31	JUPITER	W.	94 26 16	2754	96 1 44	2769	97 36 52	2785	99 11 40	2800
	Antares	W.	86 14 41	2830	87 48 18	2854	89 21 36	2869	90 54 35	2883
	α Aquilæ	W.	46 1 20	4072	47 11 49	4022	48 23 7	3977	49 35 9	3939
	α Arietis	E.	62 29 12	2987	60 58 43	3008	59 28 40	3030	57 59 4	3052
	SUN	E.	96 12 49	3142	94 45 30	3158	93 18 31	3174	91 51 51	3190



## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Added to Apparent Time.			
Frid.	1	<sup>h</sup> 4 <sup>m</sup> 39 <sup>s</sup> 13.73	10.241	N. 22° 9' 14.0	+19.72	15' 48.24	<sup>s</sup> 68.45	<sup>m</sup> 2 <sup>s</sup> 21.58	<sup>s</sup> 0.384	
Sat.	2	4 43 19.71	10.258	22 16 55.9	18.75	15 48.10	68.50	2 12.18	0.401	
SUN.	3	4 47 26.09	10.274	22 24 14.5	17.78	15 47.97	68.55	2 2.38	0.417	
Mon.	4	4 51 32.86	10.289	22 31 9.7	+16.80	15 47.84	68.60	1 52.20	0.432	
Tues.	5	4 55 39.97	10.303	22 37 41.3	15.82	15 47.72	68.65	1 41.67	0.446	
Wed.	6	4 59 47.42	10.316	22 43 49.2	14.83	15 47.60	68.69	1 30.80	0.459	
Thur.	7	5 3 55.17	10.329	22 49 33.2	+13.83	15 47.49	68.73	1 19.63	0.472	
Frid.	8	5 8 3.22	10.340	22 54 53.2	12.83	15 47.38	68.77	1 8.18	0.483	
Sat.	9	5 12 11.53	10.351	22 59 49.1	11.82	15 47.27	68.80	0 56.46	0.494	
SUN.	10	5 16 20.08	10.360	23 4 20.8	+10.81	15 47.17	68.83	0 44.51	0.503	
Mon.	11	5 20 28.84	10.369	23 8 28.1	9.79	15 47.08	68.86	0 32.35	0.512	
Tues.	12	5 24 37.78	10.376	23 12 10.9	8.77	15 46.99	68.89	0 19.99	0.519	
Wed.	13	5 28 46.88	10.382	23 15 29.2	+ 7.75	15 46.90	68.91	0 7.47	0.525	
Thur.	14	5 32 56.12	10.387	23 18 22.8	6.72	15 46.82	68.93	0 5.17	0.530	
Frid.	15	5 37 5.46	10.391	23 20 51.8	5.69	15 46.75	68.94	0 17.91	0.534	
Sat.	16	5 41 14.89	10.394	23 22 56.1	+ 4.66	15 46.68	68.96	0 30.75	0.537	
SUN.	17	5 45 24.38	10.396	23 24 35.5	3.63	15 46.62	68.97	0 43.65	0.539	
Mon.	18	5 49 33.91	10.397	23 25 50.2	2.60	15 46.56	68.97	0 56.58	0.540	
Tues.	19	5 53 43.44	10.396	23 26 40.1	+ 1.56	15 46.51	68.97	1 9.52	0.540	
Wed.	20	5 57 52.97	10.395	23 27 5.2	+ 0.52	15 46.46	68.97	1 22.45	0.539	
Thur.	21	6 2 2.47	10.393	23 27 5.4	- 0.52	15 46.41	68.97	1 35.36	0.537	
Frid.	22	6 6 11.92	10.391	23 26 40.8	- 1.55	15 46.36	68.96	1 48.22	0.534	
Sat.	23	6 10 21.30	10.388	23 25 51.3	2.58	15 46.32	68.95	2 1.00	0.531	
SUN.	24	6 14 30.58	10.384	23 24 37.1	3.61	15 46.28	68.94	2 13.68	0.527	
Mon.	25	6 18 39.74	10.379	23 22 58.2	- 4.63	15 46.25	68.93	2 26.27	0.522	
Tues.	26	6 22 48.79	10.373	23 20 54.7	5.66	15 46.22	68.91	2 38.74	0.516	
Wed.	27	6 26 57.71	10.367	23 18 26.6	6.68	15 46.19	68.88	2 51.06	0.510	
Thur.	28	6 31 6.47	10.360	23 15 33.9	- 7.70	15 46.17	68.86	3 3.22	0.503	
Frid.	29	6 35 15.03	10.353	23 12 16.7	8.72	15 46.15	68.83	3 15.20	0.496	
Sat.	30	6 39 23.39	10.344	23 8 35.2	9.73	15 46.13	68.80	3 26.96	0.487	
SUN.	31	6 43 31.51	10.333	N. 23 4 29.4	-10.74	15 46.12	68.76	3 38.49	0.476	

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.19 from the sidereal time.

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing; the sign — indicates that north declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to		Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Subtracted from Mean Time.			
Frid.	1	<sup>h</sup> 4 <sup>m</sup> 39 <sup>s</sup> 14.13	10.240	N. 22° 9' 14.8"	+19.72	<sup>m</sup> 2 <sup>s</sup> 21.57	<sup>s</sup> 0.384	<sup>h</sup> 4 <sup>m</sup> 41 <sup>s</sup> 35.69	
Sat.	2	4 43 20.09	10.257	22 16 56.6	18.75	2 12.17	0.401	4 45 32.25	
SUN.	3	4 47 26.41	10.273	22 24 15.1	17.78	2 2.37	0.417	4 49 28.81	
Mon.	4	4 51 33.18	10.288	22 31 10.2	+16.80	1 52.19	0.432	4 53 25.36	
Tues.	5	4 55 40.26	10.302	22 37 41.8	15.82	1 41.66	0.446	4 57 21.92	
Wed.	6	4 59 47.68	10.315	22 43 49.6	14.83	1 30.79	0.459	5 1 18.47	
Thur.	7	5 3 55.40	10.328	22 49 33.5	+13.83	1 19.62	0.472	5 5 15.03	
Frid.	8	5 8 3.42	10.339	22 54 53.5	12.83	1 8.17	0.483	5 9 11.59	
Sat.	9	5 12 11.70	10.350	22 59 49.3	11.82	0 56.45	0.494	5 13 8.15	
SUN.	10	5 16 20.21	10.359	23 4 20.9	+10.81	0 41.50	0.503	5 17 4.71	
Mon.	11	5 20 28.93	10.368	23 8 28.2	9.79	0 32.31	0.512	5 21 1.27	
Tues.	12	5 24 37.84	10.375	23 12 11.0	8.77	0 19.98	0.519	5 24 57.82	
Wed.	13	5 28 46.91	10.381	23 15 29.2	+ 7.75	0 7.47	0.525	5 28 54.38	
Thur.	14	5 32 56.11	10.386	23 18 22.8	6.72	0 5.17	0.530	5 32 50.94	
Frid.	15	5 37 5.41	10.390	23 20 51.8	5.69	0 17.91	0.534	5 36 47.50	
Sat.	16	5 41 14.80	10.393	23 22 56.1	+ 4.66	0 30.75	0.537	5 40 44.05	
SUN.	17	5 45 24.25	10.395	23 24 35.5	3.63	0 43.64	0.539	5 44 40.61	
Mon.	18	5 49 33.74	10.396	23 25 50.2	2.60	0 56.57	0.540	5 48 37.17	
Tues.	19	5 53 43.24	10.396	23 26 40.1	+ 1.56	1 9 51	0.540	5 52 33.73	
Wed.	20	5 57 52.73	10.395	23 27 5.2	+ 0.52	1 22.44	0.539	5 56 30.28	
Thur.	21	6 2 2.19	10.393	23 27 5.4	- 0.52	1 35.35	0.537	6 0 26.84	
Frid.	22	6 6 11.61	10.390	23 26 40.8	- 1.55	1 48.21	0.534	6 4 23.40	
Sat.	23	6 10 20.95	10.387	23 25 51.4	2.58	2 0.99	0.531	6 8 19.96	
SUN.	24	6 14 30.19	10.383	23 24 37.2	3.61	2 13.67	0.527	6 12 16.51	
Mon.	25	6 18 39.32	10.378	23 22 58.3	- 4.63	2 26.25	0.522	6 16 13.07	
Tues.	26	6 22 48.34	10.372	23 20 54.9	5.66	2 38.72	0.516	6 20 9.62	
Wed.	27	6 26 57.22	10.366	23 18 26.9	6.68	2 51.04	0.510	6 24 6.18	
Thur.	28	6 31 5.94	10.359	23 15 34.3	- 7.70	3 3.20	0.503	6 28 2.74	
Frid.	29	6 35 14.47	10.352	23 12 17.2	8.72	3 15.17	0.496	6 31 59.30	
Sat.	30	6 39 22.79	10.343	23 8 35.8	9.73	3 26.93	0.487	6 35 55.86	
SUN.	31	6 43 30.88	10.332	N. 23 4 30.1	-10.74	3 38.46	0.476	6 39 52.42	

**NOTE.**—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
 The sign + prefixed to the hourly change of declination indicates that north declinations are increasing; the sign -- indicates that north declinations are decreasing.

Diff. for 1 Hour,  
 + 9".565,  
 (Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	153	71° 21' 45.2	21° 39.8	143.63	— 0.58	0.0062587	+26.6	19 15 14.53
2	154	72 19 11.8	19 6.2	143.60	0.69	0.0063218	25.9	19 11 18.62
3	155	73 16 37.7	16 31.9	143.57	0.77	0.0063830	25.1	19 7 22.71
4	156	74 14 3.0	13 57.0	143.54	— 0.83	0.0064422	+24.2	19 3 26.80
5	157	75 11 27.6	11 21.5	143.51	0.86	0.0064992	23.3	18 59 30.89
6	158	76 8 51.6	8 45.4	143.48	0.86	0.0065540	22.3	18 55 34.98
7	159	77 6 14.9	6 8.5	143.46	— 0.83	0.0066064	+21.3	18 51 39.07
8	160	78 3 57.5	3 30.9	143.43	0.77	0.0066564	20.3	18 47 43.15
9	161	79 0 59.4	0 52.6	143.40	0.69	0.0067037	19.2	18 43 47.24
10	162	79 58 20.6	58 13.7	143.37	— 0.58	0.0067486	+18.2	18 39 51.33
11	163	80 55 41.0	55 34.0	143.33	0.46	0.0067910	17.2	18 35 55.42
12	164	81 53 0.6	52 53.4	143.30	0.33	0.0068309	16.2	18 31 59.50
13	165	82 50 19.4	50 12.0	143.27	— 0.20	0.0068685	+15.2	18 28 3.59
14	166	83 47 37.4	47 29.8	143.24	— 0.07	0.0069036	14.2	18 24 7.68
15	167	84 44 51.6	44 46.8	143.20	+ 0.05	0.0069364	13.3	18 20 11.77
16	168	85 42 10.9	42 3.0	143.17	+ 0.14	0.0069671	+12.4	18 16 15.86
17	169	86 39 26.4	39 18.3	143.13	0.22	0.0069958	11.6	18 12 19.95
18	170	87 36 41.2	36 32.9	143.10	0.26	0.0070226	10.8	18 8 24.04
19	171	88 33 55.3	33 46.9	143.07	+ 0.28	0.0070476	+10.1	18 4 28.13
20	172	89 31 8.8	31 0.2	143.04	0.26	0.0070710	9.4	18 0 32.22
21	173	90 28 21.6	28 12.9	143.02	0.23	0.0070928	8.8	17 56 36.31
22	174	91 25 33.9	25 25.0	143.00	+ 0.16	0.0071131	+ 8.1	17 52 40.40
23	175	92 22 45.8	22 36.7	142.99	+ 0.06	0.0071318	7.5	17 48 44.49
24	176	93 19 57.4	19 48.1	142.97	— 0.05	0.0071492	6.9	17 44 48.57
25	177	94 17 8.7	16 59.3	142.96	— 0.18	0.0071652	+ 6.3	17 40 52.66
26	178	95 14 19.9	14 10.3	142.95	0.31	0.0071797	5.7	17 36 56.75
27	179	96 11 31.0	11 21.2	142.95	0.44	0.0071927	5.1	17 33 0.84
28	180	97 8 42.1	8 32.1	142.96	— 0.56	0.0072042	+ 4.4	17 29 4.92
29	181	98 5 53.3	5 43.1	142.97	0.67	0.0072140	3.7	17 25 9.01
30	182	99 3 4.7	2 54.4	142.98	0.76	0.0072220	2.9	17 21 13.10
31	183	100 0 16.3	0 5.9	142.99	— 0.82	0.0072281	+ 2.1	17 17 17.19
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>d</sup> .0.								
Diff. for 1 Hour, — 9 <sup>m</sup> .8296. (Table II.)								

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month. .	THE MOON'S								
	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
1	15' 12.5	15' 6.9	55' 41.9	-1.80	55' 21.4	-1.61	h m 18 46.9	m 1.82	d 21.4
2	15 2.0	14 57.6	55 3.2	1.42	54 47.3	1.23	19 29.9	1.76	22.4
3	14 53.9	14 50.8	54 33.7	1.03	54 22.5	0.83	20 11.7	1.73	23.4
4	14 48.4	14 46.7	54 13.7	-0.64	54 7.1	-0.46	20 53.3	1.74	24.4
5	14 45.4	14 44.8	54 2.6	-0.29	54 0.2	-0.12	21 35.4	1.78	25.4
6	14 44.6	14 45.0	53 59.7	+0.03	54 1.0	+0.17	22 18.8	1.84	26.4
7	14 45.8	14 47.0	54 3.9	+0.30	54 8.3	+0.43	23 4.0	1.92	27.4
8	14 48.6	14 50.5	54 14.2	0.55	54 21.4	0.65	23 51.1	2.01	28.4
9	14 52.8	14 55.4	54 29.7	0.74	54 39.1	0.83	δ		29.4
10	14 58.2	15 1.3	54 49.5	+0.91	55 0.9	+0.99	0 40.1	2.08	0.8
11	15 4.6	15 8.2	55 13.2	1.06	55 26.4	1.14	1 30.6	2.13	1.8
12	15 12.1	15 16.1	55 40.5	1.21	55 55.4	1.28	2 21.9	2.14	2.8
13	15 20.4	15 24.9	56 11.1	+1.34	56 27.6	+1.41	3 13.2	2.13	3.8
14	15 29.6	15 34.6	56 45.0	1.48	57 3.1	1.54	4 4.0	2.10	4.8
15	15 39.7	15 45.0	57 21.9	1.59	57 41.3	1.63	4 54.2	2.08	5.8
16	15 50.4	15 55.8	58 1.1	+1.66	58 21.2	+1.67	5 43.8	2.06	6.8
17	16 1.3	16 6.6	58 41.2	1.65	59 0.9	1.61	6 33.5	2.08	7.8
18	16 11.9	16 16.7	59 19.9	1.54	59 37.9	1.43	7 24.0	2.13	8.8
19	16 21.2	16 25.1	59 54.3	+1.28	60 8.6	+1.09	8 16.1	2.22	9.8
20	16 28.3	16 30.8	60 20.5	0.87	60 29.5	+0.61	9 10.7	2.34	10.8
21	16 32.3	16 32.6	60 35.1	+0.32	60 37.1	0.00	10 8.1	2.45	11.8
22	16 32.3	16 30.7	60 35.2	-0.32	60 29.4	-0.65	11 8.1	2.54	12.8
23	16 28.1	16 24.5	60 19.7	0.96	60 6.3	1.26	12 9.3	2.55	13.8
24	16 19.9	16 14.5	59 49.4	1.53	59 29.6	1.76	13 10.0	2.49	14.8
25	16 8.4	16 1.7	59 7.2	-1.95	58 42.9	-2.08	14 8.4	2.36	15.8
26	15 54.8	15 47.6	58 17.3	2.16	57 51.0	2.20	15 3.1	2.20	16.8
27	15 40.4	15 33.3	57 24.5	2.19	56 58.4	2.14	15 53.9	2.04	17.8
28	15 26.4	15 19.8	56 33.1	-2.06	56 9.0	-1.94	16 41.3	1.91	18.8
29	15 13.7	15 8.2	55 46.6	1.79	55 26.1	1.62	17 25.8	1.81	19.8
30	15 3.2	14 58.8	55 7.8	1.43	54 51.7	1.24	18 8.6	1.76	20.8
31	14 55.1	14 52.1	54 38.1	-1.03	54 27.0	-0.82	18 50.5	1.74	21.8

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 1.					SUNDAY 3.				
0	22 54 37.42	2.0058	S. 10° 28' 10.5"	9.904	0	0 27 0.81	1.8663	S. 2° 5' 5.8"	10.786
1	22 56 37.61	2.0016	10 18 15.2	9.940	1	0 28 52.75	1.8649	1 54 18.6	10.787
2	22 58 37.61	1.9974	10 8 17.7	9.976	2	0 30 44.60	1.8635	1 43 31.3	10.788
3	23 0 37.32	1.9932	9 58 18.1	10.010	3	0 32 36.37	1.8622	1 32 44.0	10.789
4	23 2 36.79	1.9891	9 48 16.5	10.044	4	0 34 28.06	1.8609	1 21 56.6	10.789
5	23 4 36.01	1.9850	9 38 12.9	10.077	5	0 36 19.67	1.8596	1 11 9.3	10.788
6	23 6 34.99	1.9810	9 28 7.3	10.109	6	0 38 11.21	1.8584	1 0 22.0	10.787
7	23 8 33.73	1.9771	9 17 50.8	10.139	7	0 40 2.68	1.8573	0 49 34.8	10.786
8	23 10 32.24	1.9732	9 7 50.6	10.168	8	0 41 54.09	1.8563	0 38 47.7	10.784
9	23 12 30.52	1.9694	8 57 39.6	10.198	9	0 43 45.44	1.8553	0 28 0.7	10.782
10	23 14 28.57	1.9657	8 47 26.8	10.227	10	0 45 36.73	1.8543	0 17 13.9	10.778
11	23 16 26.40	1.9619	8 37 12.3	10.255	11	0 47 27.96	1.8534	S. 0 6 27.4	10.773
12	23 18 24.00	1.9582	8 26 56.2	10.282	12	0 49 19.14	1.8526	N. 0 4 18.9	10.769
13	23 20 21.39	1.9547	8 16 38.5	10.308	13	0 51 10.28	1.8519	0 15 4.9	10.764
14	23 22 18.57	1.9512	8 6 19.2	10.334	14	0 53 1.37	1.8511	0 25 50.6	10.758
15	23 24 15.54	1.9477	7 55 58.4	10.358	15	0 54 52.41	1.8504	0 36 35.9	10.752
16	23 26 12.30	1.9442	7 45 36.2	10.382	16	0 56 43.41	1.8497	0 47 20.8	10.745
17	23 28 8.85	1.9408	7 35 12.6	10.406	17	0 58 34.38	1.8492	0 58 5.3	10.737
18	23 30 5.20	1.9376	7 24 47.5	10.429	18	1 0 25.32	1.8487	1 8 49.3	10.729
19	23 32 1.36	1.9344	7 14 21.1	10.450	19	1 2 16.23	1.8483	1 19 32.8	10.721
20	23 33 57.33	1.9313	7 3 53.5	10.471	20	1 4 7.12	1.8479	1 30 15.8	10.712
21	23 35 53.11	1.9282	6 53 24.6	10.492	21	1 5 57.98	1.8476	1 40 58.2	10.702
22	23 37 48.71	1.9251	6 42 54.5	10.511	22	1 7 48.83	1.8473	1 51 40.0	10.691
23	23 39 44.12	1.9220	S. 6 32 23.3	10.530	23	1 9 39.66	1.8471	N. 2 2 21.1	10.680
SATURDAY 2.					MONDAY 4.				
0	23 41 39.35	1.9191	S. 6 21 50.9	10.548	0	1 11 30.48	1.8469	N. 2 13 1.6	10.669
1	23 43 34.41	1.9162	6 11 17.5	10.565	1	1 13 21.29	1.8468	2 23 41.4	10.656
2	23 45 29.30	1.9134	6 0 43.1	10.582	2	1 15 12.10	1.8467	2 34 20.4	10.643
3	23 47 24.02	1.9107	5 50 7.6	10.599	3	1 17 2.90	1.8467	2 44 58.6	10.630
4	23 49 18.58	1.9080	5 39 31.2	10.614	4	1 18 53.70	1.8467	2 55 36.0	10.617
5	23 51 12.98	1.9053	5 28 53.9	10.629	5	1 20 44.51	1.8468	3 6 12.6	10.603
6	23 53 7.92	1.9027	5 18 15.7	10.643	6	1 22 35.32	1.8470	3 16 48.3	10.588
7	23 55 1.31	1.9002	5 7 36.7	10.657	7	1 24 26.15	1.8472	3 27 23.1	10.572
8	23 56 55.25	1.8977	4 56 56.9	10.669	8	1 26 16.99	1.8474	3 37 56.9	10.555
9	23 58 49.04	1.8953	4 46 16.4	10.681	9	1 28 7.84	1.8477	3 48 29.7	10.539
10	0 0 42.69	1.8930	4 35 35.2	10.692	10	1 29 58.71	1.8481	3 59 1.5	10.522
11	0 2 36.20	1.8907	4 24 53.3	10.703	11	1 31 49.61	1.8485	4 9 32.3	10.504
12	0 4 29.57	1.8884	4 14 10.8	10.713	12	1 33 40.53	1.8489	4 20 2.0	10.485
13	0 6 22.81	1.8863	4 3 27.7	10.723	13	1 35 31.48	1.8494	4 30 30.5	10.465
14	0 8 15.93	1.8842	3 52 44.1	10.732	14	1 37 22.46	1.8500	4 40 57.8	10.446
15	0 10 8.92	1.8822	3 41 59.9	10.740	15	1 39 13.48	1.8507	4 51 24.0	10.426
16	0 12 1.79	1.8802	3 31 15.3	10.748	16	1 41 4.54	1.8513	5 1 48.9	10.405
17	0 13 54.54	1.8782	3 20 30.2	10.755	17	1 42 55.64	1.8520	5 12 12.6	10.384
18	0 15 47.18	1.8764	3 9 44.7	10.761	18	1 44 46.78	1.8527	5 22 35.0	10.362
19	0 17 39.71	1.8746	2 58 58.9	10.766	19	1 46 37.96	1.8535	5 32 56.0	10.339
20	0 19 32.13	1.8728	2 48 12.8	10.771	20	1 48 29.20	1.8544	5 43 15.7	10.316
21	0 21 24.45	1.8711	2 37 26.4	10.775	21	1 50 20.49	1.8553	5 53 34.0	10.292
22	0 23 16.67	1.8695	2 26 39.8	10.779	22	1 52 11.83	1.8562	6 3 50.8	10.267
23	0 25 8.79	1.8679	2 15 52.9	10.783	23	1 54 3.23	1.8572	6 14 6.1	10.243
24	0 27 0.81	1.8663	S. 2 5 5.8	10.786	24	1 55 54.70	1.8583	N. 6 24 20.0	10.218

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 5.					THURSDAY 7.				
0	<sup>h</sup> 1 <sup>m</sup> 55 <sup>s</sup> 54.70	1.8583	N. 6° 24' 20.0	10.318	0	<sup>h</sup> 3 <sup>m</sup> 27 <sup>s</sup> 7.02	1.9561	N. 13° 53' 53.0	8.372
1	1 57 46.23	1.8594	6 34 32.3	10.192	1	3 29 4.47	1.9569	14 2 7.6	8.215
2	1 59 37.83	1.8605	6 44 43.0	10.165	2	3 31 2.09	1.9618	14 10 18.8	8.157
3	2 1 29.49	1.8617	6 54 52.1	10.137	3	3 32 59.89	1.9647	14 18 26.5	8.100
4	2 3 21.23	1.8629	7 4 59.5	10.109	4	3 34 57.86	1.9676	14 26 30.8	8.042
5	2 5 13.04	1.8642	7 15 5.2	10.081	5	3 36 56.00	1.9705	14 34 31.5	7.983
6	2 7 4.93	1.8655	7 25 9.3	10.053	6	3 38 54.32	1.9735	14 42 28.7	7.923
7	2 8 56.90	1.8668	7 35 11.6	10.023	7	3 40 52.82	1.9764	14 50 22.3	7.863
8	2 10 48.95	1.8682	7 45 12.1	9.992	8	3 42 51.40	1.9793	14 58 12.2	7.801
9	2 12 41.09	1.8697	7 55 10.7	9.961	9	3 44 50.34	1.9822	15 5 58.4	7.739
10	2 14 33.32	1.8712	8 5 7.4	9.930	10	3 46 49.37	1.9853	15 13 40.9	7.677
11	2 16 25.64	1.8727	8 15 2.3	9.899	11	3 48 48.58	1.9884	15 21 19.7	7.615
12	2 18 18.05	1.8743	8 24 55.3	9.867	12	3 50 47.98	1.9915	15 28 54.7	7.551
13	2 20 10.56	1.8760	8 34 46.3	9.833	13	3 52 47.56	1.9945	15 36 25.8	7.487
14	2 22 3.17	1.8778	8 44 35.2	9.798	14	3 54 47.32	1.9976	15 43 53.1	7.422
15	2 23 55.87	1.8793	8 54 22.1	9.764	15	3 56 47.27	2.0007	15 51 16.4	7.355
16	2 25 48.68	1.8811	9 4 6.9	9.729	16	3 58 47.40	2.0038	15 58 35.7	7.289
17	2 27 41.60	1.8829	9 13 49.6	9.693	17	4 0 47.72	2.0069	16 5 51.0	7.222
18	2 29 34.63	1.8847	9 23 30.1	9.657	18	4 2 48.23	2.0101	16 13 2.3	7.154
19	2 31 27.77	1.8866	9 33 8.5	9.621	19	4 4 48.93	2.0132	16 20 9.5	7.085
20	2 33 21.02	1.8885	9 42 44.6	9.583	20	4 6 49.81	2.0163	16 27 12.5	7.016
21	2 35 14.39	1.8904	9 52 18.4	9.544	21	4 8 50.88	2.0194	16 34 11.4	6.947
22	2 37 7.87	1.8924	10 1 49.9	9.505	22	4 10 52.14	2.0226	16 41 6.1	6.876
23	2 39 1.48	1.8945	N 10 11 19.0	9.466	23	4 12 53.59	2.0257	N. 16 47 56.5	6.805
WEDNESDAY 6.					FRIDAY 8.				
0	2 40 55.21	1.8966	N. 10 20 45.8	9.427	0	4 14 55.22	2.0288	N. 16 54 42.7	6.733
1	2 42 49.07	1.8987	10 30 10.2	9.386	1	4 16 57.04	2.0320	17 1 24.5	6.660
2	2 44 43.05	1.9008	10 39 32.1	9.344	2	4 18 59.06	2.0352	17 8 1.9	6.587
3	2 46 37.16	1.9030	10 48 51.4	9.301	3	4 21 1.27	2.0384	17 14 35.0	6.514
4	2 48 31.41	1.9052	10 58 8.2	9.259	4	4 23 3.67	2.0416	17 21 3.6	6.439
5	2 50 25.79	1.9074	11 7 22.5	9.216	5	4 25 6.26	2.0447	17 27 27.7	6.363
6	2 52 20.30	1.9097	11 16 34.2	9.173	6	4 27 9.04	2.0479	17 33 47.2	6.287
7	2 54 14.95	1.9120	11 25 43.3	9.128	7	4 29 12.01	2.0512	17 40 2.1	6.211
8	2 56 9.74	1.9144	11 34 49.6	9.083	8	4 31 15.18	2.0544	17 46 12.5	6.135
9	2 58 4.68	1.9168	11 43 53.2	9.037	9	4 33 18.54	2.0575	17 52 18.3	6.057
10	2 59 59.76	1.9192	11 52 54.0	8.990	10	4 35 22.08	2.0606	17 58 19.4	5.978
11	3 1 54.99	1.9217	12 1 52.0	8.943	11	4 37 25.81	2.0637	18 4 15.7	5.898
12	3 3 50.36	1.9241	12 10 47.2	8.896	12	4 39 29.73	2.0669	18 10 7.2	5.818
13	3 5 45.88	1.9266	12 19 39.5	8.847	13	4 41 33.84	2.0701	18 15 53.9	5.738
14	3 7 41.56	1.9292	12 28 28.9	8.798	14	4 43 38.14	2.0732	18 21 35.8	5.657
15	3 9 37.39	1.9317	12 37 15.3	8.748	15	4 45 42.63	2.0764	18 27 12.8	5.576
16	3 11 33.37	1.9343	12 45 58.7	8.697	16	4 47 47.31	2.0796	18 32 44.9	5.494
17	3 13 29.51	1.9370	12 54 39.0	8.647	17	4 49 52.18	2.0827	18 38 12.0	5.411
18	3 15 25.81	1.9397	13 3 16.3	8.596	18	4 51 57.23	2.0858	18 43 34.2	5.327
19	3 17 22.27	1.9423	13 11 50.5	8.543	19	4 54 2.47	2.0889	18 48 51.3	5.242
20	3 19 18.89	1.9450	13 20 21.5	8.489	20	4 56 7.90	2.0920	18 54 3.3	5.157
21	3 21 15.67	1.9478	13 28 49.2	8.435	21	4 58 13.51	2.0950	18 59 10.2	5.072
22	3 23 12.62	1.9506	13 37 13.7	8.382	22	5 0 19.30	2.0981	19 4 12.0	4.986
23	3 25 9.74	1.9533	13 45 35.0	8.328	23	5 2 25.28	2.1012	19 9 8.6	4.899
24	3 27 7.02	1.9561	N. 13 53 53.0	8.272	24	5 4 31.44	2.1042	N. 19 13 59.9	4.812

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 9.					MONDAY 11.				
0	h m s	s	N. 19° 13'	4.812	0	h m s	s	N. 21° 14'	+ 0.037
1	5 4 31.44	2.1042	19 18 46.0	4.794	1	6 48 30.11	2.2144	21 14 20.5	- 0.071
2	5 6 37.78	2.1073	19 23 26.8	4.636	2	6 50 43.01	2.2157	21 14 20.5	0.179
3	5 8 44.30	2.1102	19 28 2.3	4.547	3	6 52 55.99	2.2170	21 13 59.0	0.288
4	5 10 51.00	2.1132	19 32 32.4	4.457	4	6 55 9.05	2.2182	21 13 38.4	0.397
5	5 12 57.88	2.1162	19 36 57.1	4.367	5	6 57 22.18	2.2193	21 13 11.3	0.506
6	5 15 4.94	2.1191	19 41 16.4	4.276	6	7 1 48.63	2.2204	21 12 37.7	0.615
7	5 17 12.17	2.1219	19 45 30.2	4.184	7	7 4 1.95	2.2215	21 11 57.5	0.724
8	5 19 19.57	2.1248	19 49 38.5	4.092	8	7 6 15.33	2.2225	21 11 10.8	0.833
9	5 21 27.15	2.1277	19 53 41.2	3.999	9	7 8 28.77	2.2235	21 10 17.6	0.942
10	5 23 34.90	2.1306	19 57 38.4	3.906	10	7 10 42.26	2.2244	21 9 17.8	1.052
11	5 25 42.82	2.1334	20 1 30.0	3.813	11	7 12 55.80	2.2252	21 8 11.4	1.161
12	5 27 50.90	2.1361	20 5 16.0	3.719	12	7 15 9.38	2.2260	21 6 58.5	1.270
13	5 29 59.15	2.1389	20 8 56.3	3.624	13	7 17 23.01	2.2267	21 5 39.0	1.380
14	5 32 7.57	2.1417	20 12 30.9	3.529	14	7 19 36.68	2.2275	21 4 12.9	1.490
15	5 34 16.15	2.1444	20 15 59.8	3.433	15	7 21 50.39	2.2282	21 2 40.2	1.600
16	5 36 24.89	2.1470	20 19 22.9	3.337	16	7 24 4.14	2.2288	21 1 0.9	1.710
17	5 38 33.79	2.1497	20 22 40.2	3.240	17	7 26 17.92	2.2294	20 59 15.0	1.819
18	5 40 42.85	2.1523	20 25 51.7	3.143	18	7 28 31.73	2.2299	20 57 22.6	1.928
19	5 42 52.07	2.1549	20 28 57.3	3.045	19	7 30 45.57	2.2304	20 55 23.6	2.038
20	5 45 1.44	2.1574	20 31 57.1	2.947	20	7 32 59.43	2.2308	20 53 18.0	2.148
21	5 47 10.96	2.1599	20 34 51.0	2.848	21	7 35 13.31	2.2312	20 51 5.8	2.257
22	5 49 20.63	2.1624	20 37 38.9	2.748	22	7 37 27.21	2.2315	20 48 47.1	2.367
23	5 51 30.45	2.1649	N. 20° 40'	2.649	23	7 39 41.13	2.2318	N. 20° 46'	2.477
24	5 53 40.42	2.1673							
SUNDAY 10.					TUESDAY 12.				
0	5 55 50.53	2.1697	N. 20° 42'	2.550	0	7 41 55.07	2.2321	N. 20° 43'	2.586
1	5 58 0.78	2.1720	20 45 26.8	2.449	1	7 44 9.02	2.2325	20 41 11.5	2.695
2	6 0 11.17	2.1743	20 47 50.7	2.347	2	7 46 22.97	2.2329	20 38 26.5	2.805
3	6 2 21.70	2.1766	20 50 8.5	2.246	3	7 48 36.92	2.2333	20 35 34.9	2.914
4	6 4 32.36	2.1789	20 52 20.2	2.144	4	7 50 50.88	2.2337	20 32 36.8	3.023
5	6 6 43.16	2.1811	20 54 25.8	2.042	5	7 53 4.84	2.2341	20 29 32.1	3.132
6	6 8 54.09	2.1832	20 56 25.3	1.940	6	7 55 18.80	2.2345	20 26 20.9	3.241
7	6 11 5.14	2.1853	20 58 18.6	1.837	7	7 57 32.75	2.2349	20 23 3.2	3.349
8	6 13 16.32	2.1873	21 0 5.7	1.733	8	7 59 46.69	2.2353	20 19 39.0	3.457
9	6 15 27.62	2.1893	21 1 46.6	1.630	9	8 2 0.63	2.2357	20 16 8.3	3.566
10	6 17 39.04	2.1913	21 3 21.3	1.526	10	8 4 14.56	2.2361	20 12 31.1	3.674
11	6 19 50.58	2.1933	21 4 49.7	1.422	11	8 6 28.47	2.2365	20 8 47.4	3.782
12	6 22 2.24	2.1952	21 6 11.9	1.317	12	8 8 42.36	2.2369	20 4 57.2	3.890
13	6 24 14.01	2.1971	21 7 27.8	1.212	13	8 10 56.23	2.2373	20 1 0.6	3.997
14	6 26 25.89	2.1989	21 8 37.3	1.106	14	8 13 10.08	2.2377	19 56 57.6	4.104
15	6 28 37.87	2.2006	21 9 40.5	1.000	15	8 15 23.91	2.2381	19 52 48.1	4.211
16	6 30 49.96	2.2023	21 10 37.3	0.894	16	8 17 37.71	2.2385	19 48 32.2	4.318
17	6 33 2.15	2.2040	21 11 27.8	0.788	17	8 19 51.49	2.2389	19 44 9.9	4.424
18	6 35 14.44	2.2057	21 12 11.9	0.682	18	8 22 5.24	2.2393	19 39 41.3	4.530
19	6 37 26.83	2.2073	21 12 49.6	0.575	19	8 24 18.96	2.2397	19 35 6.3	4.636
20	6 39 39.31	2.2088	21 13 20.9	0.467	20	8 26 32.64	2.2401	19 30 25.0	4.742
21	6 41 51.88	2.2103	21 13 45.7	0.360	21	8 28 46.28	2.2405	19 25 37.3	4.847
22	6 44 4.54	2.2117	21 14 4.1	0.252	22	8 30 59.88	2.2409	19 20 43.3	4.952
23	6 46 17.28	2.2131	21 14 16.0	0.145	23	8 33 13.45	2.2413	19 15 43.1	5.056
24	6 48 30.11	2.2144	N. 21° 14'	+ 0.037	24	8 35 26.98	2.2417	N. 19° 10'	5.160

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 13.					FRIDAY 15.				
0	8 35 26.98	2.2251	N. 19° 10' 36.6"	5.160	0	10 21 6.64	2.1757	N. 13° 11' 36.2"	9.581
1	8 37 40.46	2.2243	19 5 23.9	5.264	1	10 23 17.16	2.1748	13 1 59.0	9.657
2	8 39 53.90	2.2236	19 0 4.9	5.368	2	10 25 27.62	2.1738	12 52 17.3	9.733
3	8 42 7.29	2.2228	18 54 39.7	5.472	3	10 27 38.02	2.1729	12 42 31.0	9.809
4	8 44 20.63	2.2219	18 49 8.3	5.574	4	10 29 48.37	2.1721	12 32 40.2	9.883
5	8 46 33.92	2.2211	18 43 30.8	5.676	5	10 31 58.67	2.1712	12 22 45.0	9.957
6	8 48 47.16	2.2202	18 37 47.2	5.777	6	10 34 8.92	2.1704	12 12 45.4	10.030
7	8 51 0.35	2.2193	18 31 57.5	5.879	7	10 36 19.12	2.1696	12 2 41.4	10.102
8	8 53 13.48	2.2184	18 26 1.7	5.981	8	10 38 29.27	2.1688	11 52 33.1	10.173
9	8 55 26.56	2.2175	18 19 59.8	6.082	9	10 40 39.38	2.1681	11 42 20.6	10.244
10	8 57 39.58	2.2166	18 13 51.9	6.182	10	10 42 49.45	2.1674	11 32 3.8	10.314
11	8 59 52.55	2.2157	18 7 38.0	6.282	11	10 44 59.47	2.1667	11 21 42.9	10.383
12	9 2 5.46	2.2147	18 1 18.1	6.381	12	10 47 9.45	2.1660	11 11 17.9	10.451
13	9 4 18.31	2.2137	17 54 52.3	6.479	13	10 49 19.39	2.1654	11 0 48.8	10.519
14	9 6 31.10	2.2126	17 48 20.6	6.578	14	10 51 29.30	2.1648	10 50 15.6	10.586
15	9 8 43.82	2.2115	17 41 42.9	6.676	15	10 53 39.17	2.1642	10 39 38.5	10.651
16	9 10 56.48	2.2105	17 34 59.4	6.773	16	10 55 49.01	2.1637	10 28 57.5	10.716
17	9 13 9.08	2.2094	17 28 10.1	6.870	17	10 57 58.82	2.1632	10 18 12.6	10.780
18	9 15 21.61	2.2083	17 21 15.0	6.967	18	11 0 8.59	2.1627	10 7 23.9	10.843
19	9 17 34.08	2.2072	17 14 14.1	7.062	19	11 2 18.34	2.1623	9 56 31.4	10.906
20	9 19 46.48	2.2062	17 7 7.5	7.157	20	11 4 28.07	2.1619	9 45 35.2	10.967
21	9 21 58.82	2.2051	16 59 55.2	7.252	21	11 6 37.77	2.1615	9 34 35.3	11.028
22	9 24 11.09	2.2039	16 52 37.2	7.347	22	11 8 47.45	2.1612	9 23 31.8	11.088
23	9 26 23.29	2.2028	N. 16° 45' 13.6"	7.441	23	11 10 57.12	2.1610	N. 9° 12' 24.7"	11.147
THURSDAY 14.					SATURDAY 16.				
0	9 28 35.43	2.2017	N. 16° 37' 44.3"	7.534	0	11 13 6.77	2.1608	N. 9° 1' 14.1"	11.206
1	9 30 47.50	2.2006	16 30 9.5	7.626	1	11 15 16.41	2.1606	8 50 0.0	11.263
2	9 32 59.50	2.1994	16 22 29.2	7.717	2	11 17 26.04	2.1604	8 38 42.5	11.319
3	9 35 11.43	2.1983	16 14 43.4	7.809	3	11 19 35.66	2.1602	8 27 21.7	11.374
4	9 37 23.29	2.1972	16 6 52.1	7.901	4	11 21 45.27	2.1601	8 15 57.6	11.429
5	9 39 35.09	2.1961	15 58 55.3	7.992	5	11 23 54.87	2.1600	8 4 30.2	11.482
6	9 41 46.82	2.1949	15 50 53.1	8.081	6	11 26 4.47	2.1600	7 52 59.7	11.535
7	9 43 58.48	2.1938	15 42 45.6	8.169	7	11 28 14.07	2.1601	7 41 26.0	11.587
8	9 46 10.07	2.1927	15 34 32.8	8.258	8	11 30 23.68	2.1602	7 29 49.2	11.638
9	9 48 21.60	2.1916	15 26 14.7	8.346	9	11 32 33.30	2.1604	7 18 9.4	11.688
10	9 50 33.06	2.1904	15 17 51.3	8.433	10	11 34 42.93	2.1606	7 6 26.6	11.737
11	9 52 44.45	2.1893	15 9 22.8	8.519	11	11 36 52.57	2.1608	6 54 40.9	11.785
12	9 54 55.77	2.1882	15 0 49.1	8.605	12	11 39 2.22	2.1610	6 42 52.4	11.832
13	9 57 7.03	2.1871	14 52 10.2	8.690	13	11 41 11.89	2.1613	6 31 1.1	11.878
14	9 59 18.22	2.1859	14 43 26.3	8.774	14	11 43 21.58	2.1617	6 19 7.0	11.924
15	10 1 29.34	2.1848	14 34 37.3	8.858	15	11 45 31.30	2.1622	6 7 10.2	11.968
16	10 3 40.40	2.1838	14 25 43.3	8.941	16	11 47 41.04	2.1626	5 55 10.8	12.012
17	10 5 51.40	2.1827	14 16 44.4	9.024	17	11 49 50.81	2.1631	5 43 8.8	12.054
18	10 8 2.33	2.1817	14 7 40.5	9.106	18	11 52 0.61	2.1637	5 31 4.3	12.096
19	10 10 13.20	2.1807	13 58 31.7	9.187	19	11 54 10.45	2.1643	5 18 57.4	12.136
20	10 12 24.01	2.1796	13 49 18.1	9.267	20	11 56 20.33	2.1649	5 6 48.0	12.176
21	10 14 34.75	2.1786	13 39 59.7	9.347	21	11 58 30.24	2.1656	4 54 36.3	12.213
22	10 16 45.44	2.1777	13 30 36.5	9.425	22	12 0 40.20	2.1664	4 42 22.4	12.250
23	10 18 56.07	2.1767	13 21 8.7	9.503	23	12 2 50.21	2.1672	4 30 6.3	12.287
24	10 21 6.64	2.1757	N. 13° 11' 36.2"	9.581	24	12 5 0.27	2.1681	N. 4° 17' 48.0"	12.323



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 17.					TUESDAY 19.				
0	12 <sup>h</sup> 5 <sup>m</sup> 0.27	2.1681	N. 4° 17' 48.0"	12.323	0	13 <sup>h</sup> 51 <sup>m</sup> 6.51	2.9739	S. 5° 52' 43.6"	12.642
1	12 7 10.38	2.1690	4 5 27.6	12.357	1	13 53 23.05	2.9775	6 5 21.4	12.617
2	12 9 20.55	2.1706	3 53 5.2	12.389	2	13 55 39.81	2.9811	6 17 57.7	12.591
3	12 11 30.78	2.1710	3 40 40.9	12.481	3	13 57 56.78	2.9847	6 30 32.3	12.569
4	12 13 41.07	2.1791	3 28 14.7	12.459	4	14 0 13.97	2.9883	6 43 5.2	12.539
5	12 15 51.43	2.1732	3 15 46.6	12.482	5	14 2 31.38	2.9920	6 55 36.2	12.501
6	12 18 1.86	2.1744	3 3 16.8	12.511	6	14 4 49.01	2.9957	7 8 5.3	12.468
7	12 20 12.36	2.1757	2 50 45.3	12.539	7	14 7 6.87	2.9995	7 20 32.4	12.434
8	12 22 22.94	2.1770	2 38 12.1	12.566	8	14 9 24.95	2.3033	7 32 57.4	12.399
9	12 24 33.60	2.1783	2 25 37.4	12.591	9	14 11 43.26	2.3072	7 45 20.3	12.369
10	12 26 44.34	2.1797	2 13 1.2	12.616	10	14 14 1.81	2.3111	7 57 40.9	12.334
11	12 28 55.16	2.1811	2 0 23.5	12.639	11	14 16 20.59	2.3150	8 9 59.2	12.304
12	12 31 6.07	2.1826	1 47 44.5	12.661	12	14 18 39.61	2.3190	8 22 15.0	12.269
13	12 33 17.08	2.1842	1 35 4.2	12.682	13	14 20 58.87	2.3230	8 34 28.3	12.230
14	12 35 28.18	2.1858	1 22 22.6	12.709	14	14 23 18.37	2.3271	8 46 39.0	12.185
15	12 37 39.38	2.1875	1 9 39.9	12.731	15	14 25 38.12	2.3312	8 58 46.9	12.148
16	12 39 50.68	2.1893	0 56 56.1	12.739	16	14 27 58.11	2.3353	9 10 52.0	12.061
17	12 42 2.09	2.1911	0 44 11.2	12.754	17	14 30 18.35	2.3394	9 22 54.2	12.019
18	12 44 13.61	2.1929	0 31 25.4	12.771	18	14 32 38.84	2.3436	9 34 53.4	11.961
19	12 46 25.24	2.1948	0 18 38.7	12.785	19	14 34 59.58	2.3478	9 46 49.5	11.909
20	12 48 36.99	2.1968	N. 0° 5' 51.2"	12.797	20	14 37 20.57	2.3520	9 58 42.5	11.856
21	12 50 48.86	2.1988	S. 0 6 57.0	12.809	21	14 39 41.82	2.3563	10 10 32.2	11.800
22	12 53 0.85	2.2008	0 19 45.9	12.820	22	14 42 3.33	2.3606	10 22 18.5	11.743
23	12 55 12.96	2.2029	S. 0 32 35.4	12.829	23	14 44 25.10	2.3649	S. 10 34 1.4	11.685
MONDAY 18.					WEDNESDAY 20.				
0	12 57 25.20	2.2051	S. 0 45 25.4	12.837	0	14 46 47.12	2.3689	S. 10 45 40.7	11.625
1	12 59 37.58	2.2074	0 58 15.9	12.844	1	14 49 9.40	2.3738	10 57 16.4	11.563
2	13 1 50.09	2.2097	1 11 6.7	12.849	2	14 51 31.95	2.3781	11 8 48.3	11.500
3	13 4 2.74	2.2121	1 23 57.8	12.854	3	14 53 54.77	2.3825	11 20 16.4	11.435
4	13 6 15.54	2.2145	1 36 49.2	12.857	4	14 56 17.85	2.3868	11 31 40.5	11.368
5	13 8 28.48	2.2169	1 49 40.7	12.859	5	14 58 41.19	2.3912	11 43 0.6	11.301
6	13 10 41.57	2.2195	2 2 32.3	12.860	6	15 1 4.79	2.3956	11 54 16.6	11.232
7	13 12 54.82	2.2221	2 15 23.9	12.859	7	15 3 28.66	2.4001	12 5 28.4	11.161
8	13 15 8.22	2.2247	2 28 15.4	12.857	8	15 5 52.80	2.4046	12 16 35.9	11.087
9	13 17 21.78	2.2273	2 41 6.8	12.854	9	15 8 17.21	2.4091	12 27 38.9	11.019
10	13 19 35.50	2.2301	2 53 57.9	12.849	10	15 10 41.89	2.4136	12 38 37.4	10.937
11	13 21 49.39	2.2329	3 6 48.7	12.843	11	15 13 6.84	2.4180	12 49 31.4	10.861
12	13 24 3.45	2.2357	3 19 39.1	12.836	12	15 15 32.05	2.4224	13 0 20.7	10.782
13	13 26 17.68	2.2387	3 32 29.0	12.827	13	15 17 57.53	2.4269	13 11 5.2	10.701
14	13 28 32.09	2.2417	3 45 18.4	12.818	14	15 20 23.28	2.4315	13 21 44.8	10.619
15	13 30 46.68	2.2447	3 58 7.2	12.807	15	15 22 49.31	2.4361	13 32 19.5	10.536
16	13 33 1.45	2.2477	4 10 55.2	12.794	16	15 25 15.61	2.4405	13 42 49.1	10.450
17	13 35 16.40	2.2507	4 23 42.4	12.780	17	15 27 42.17	2.4449	13 53 13.5	10.363
18	13 37 31.54	2.2539	4 36 28.8	12.765	18	15 30 9.00	2.4494	14 3 32.7	10.275
19	13 39 46.87	2.2571	4 49 14.2	12.748	19	15 32 36.10	2.4538	14 13 46.5	10.185
20	13 42 2.40	2.2604	5 1 58.6	12.730	20	15 35 3.46	2.4583	14 23 54.9	10.094
21	13 44 18.12	2.2638	5 14 41.8	12.709	21	15 37 31.09	2.4627	14 33 57.8	10.002
22	13 46 34.05	2.2672	5 27 23.7	12.688	22	15 39 58.98	2.4671	14 43 55.1	9.907
23	13 48 50.18	2.2705	5 40 4.3	12.666	23	15 42 27.14	2.4715	14 53 46.6	9.810
24	13 51 6.51	2.2739	S. 5° 52' 43.6"	12.642	24	15 44 55.56	2.4758	S. 15 3 32.3	9.719

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 21.					SATURDAY 23.				
0	<sup>h</sup> 15 <sup>m</sup> 44 <sup>s</sup> 55.56	2.4758	S. 15° 3' 32.3"	9.712	0	<sup>h</sup> 17 <sup>m</sup> 47 <sup>s</sup> 49.98	2.6155	S. 20° 32' 22.8"	3.576
1	15 47 24.24	2.4809	15 13 12.1	9.614	1	17 50 26.93	2.6161	20 35 52.9	3.427
2	15 49 53.18	2.4845	15 22 46.0	9.514	2	17 53 3.91	2.6165	20 39 14.0	3.277
3	15 52 22.38	2.4888	15 32 13.8	9.412	3	17 55 40.91	2.6168	20 42 26.1	3.127
4	15 54 51.84	2.4931	15 41 35.5	9.309	4	17 58 17.93	2.6171	20 45 29.2	2.977
5	15 57 21.55	2.4973	15 50 50.9	9.204	5	18 0 54.96	2.6172	20 48 23.3	2.827
6	15 59 51.51	2.5014	16 0 0.0	9.097	6	18 3 32.00	2.6172	20 51 8.4	2.676
7	16 2 21.72	2.5056	16 9 2.6	8.990	7	18 6 9.03	2.6171	20 53 44.4	2.525
8	16 4 52.18	2.5097	16 17 58.8	8.882	8	18 8 46.05	2.6169	20 56 11.4	2.375
9	16 7 22.88	2.5138	16 26 48.4	8.771	9	18 11 23.06	2.6166	20 58 29.4	2.224
10	16 9 53.83	2.5178	16 35 31.3	8.658	10	18 14 0.04	2.6161	21 0 38.3	2.073
11	16 12 25.02	2.5217	16 44 7.4	8.545	11	18 16 36.99	2.6154	21 2 38.1	1.922
12	16 14 56.44	2.5257	16 52 36.7	8.431	12	18 19 13.89	2.6146	21 4 28.9	1.771
13	16 17 28.10	2.5296	17 0 59.1	8.315	13	18 21 50.74	2.6137	21 6 10.6	1.619
14	16 19 59.99	2.5334	17 9 14.5	8.197	14	18 24 27.54	2.6128	21 7 43.2	1.468
15	16 22 32.10	2.5371	17 17 22.8	8.079	15	18 27 4.28	2.6117	21 9 6.8	1.317
16	16 25 4.44	2.5408	17 25 24.0	7.959	16	18 29 40.94	2.6104	21 10 21.3	1.167
17	16 27 37.00	2.5445	17 33 17.9	7.837	17	18 32 17.52	2.6090	21 11 26.8	1.016
18	16 30 9.78	2.5481	17 41 4.5	7.715	18	18 34 54.02	2.6075	21 12 23.2	0.865
19	16 32 42.77	2.5516	17 48 43.7	7.592	19	18 37 30.42	2.6058	21 13 10.6	0.715
20	16 35 15.97	2.5550	17 56 15.5	7.467	20	18 40 6.72	2.6041	21 13 49.0	0.565
21	16 37 49.37	2.5583	18 3 39.7	7.341	21	18 42 42.92	2.6023	21 14 18.4	0.415
22	16 40 22.97	2.5616	18 10 56.4	7.214	22	18 45 19.00	2.6003	21 14 38.8	0.265
23	16 42 56.77	2.5649	S. 18 18 5.4	7.085	23	18 47 54.96	2.5982	S. 21 14 50.2	-0.115
FRIDAY 22.					SUNDAY 24.				
0	16 45 30.76	2.5681	S. 18 25 6.6	6.955	0	18 50 30.79	2.5960	S. 21 14 52.6	+0.034
1	16 48 4.94	2.5712	18 32 0.0	6.825	1	18 53 6.48	2.5937	21 14 46.1	0.182
2	16 50 39.30	2.5741	18 38 45.6	6.693	2	18 55 42.03	2.5912	21 14 30.8	0.329
3	16 53 13.83	2.5770	18 45 23.2	6.560	3	18 58 17.42	2.5885	21 14 6.6	0.477
4	16 55 48.54	2.5799	18 51 52.8	6.427	4	19 0 52.65	2.5858	21 13 33.5	0.625
5	16 58 23.42	2.5827	18 58 14.4	6.292	5	19 3 27.72	2.5830	21 12 51.6	0.771
6	17 0 58.46	2.5853	19 4 27.8	6.155	6	19 6 2.61	2.5800	21 12 1.0	0.917
7	17 3 33.65	2.5878	19 10 33.0	6.018	7	19 8 37.32	2.5770	21 11 1.6	1.062
8	17 6 8.99	2.5903	19 16 30.0	5.881	8	19 11 11.85	2.5739	21 9 53.5	1.207
9	17 8 44.48	2.5927	19 22 18.8	5.743	9	19 13 46.19	2.5707	21 8 36.7	1.352
10	17 11 20.11	2.5949	19 27 59.2	5.603	10	19 16 20.33	2.5673	21 7 11.3	1.495
11	17 13 55.87	2.5971	19 33 31.2	5.462	11	19 18 54.26	2.5638	21 5 37.3	1.638
12	17 16 31.76	2.5992	19 38 54.7	5.321	12	19 21 27.98	2.5602	21 3 54.7	1.781
13	17 19 7.77	2.6011	19 44 9.7	5.179	13	19 24 1.48	2.5565	21 2 3.6	1.922
14	17 21 43.89	2.6029	19 49 16.2	5.037	14	19 26 34.76	2.5527	21 0 4.1	2.063
15	17 24 20.12	2.6047	19 54 14.2	4.894	15	19 29 7.80	2.5488	20 57 56.1	2.203
16	17 26 56.45	2.6063	19 59 3.5	4.749	16	19 31 40.61	2.5448	20 55 39.7	2.342
17	17 29 32.88	2.6079	20 3 44.1	4.604	17	19 34 13.18	2.5407	20 53 15.0	2.480
18	17 32 9.40	2.6093	20 8 16.0	4.459	18	19 36 45.50	2.5365	20 50 42.1	2.618
19	17 34 46.00	2.6106	20 12 39.2	4.313	19	19 39 17.56	2.5322	20 48 0.9	2.755
20	17 37 22.67	2.6117	20 16 53.6	4.166	20	19 41 49.36	2.5278	20 45 11.5	2.890
21	17 39 59.41	2.6128	20 20 59.2	4.019	21	19 44 20.90	2.5234	20 42 14.1	3.024
22	17 42 36.21	2.6138	20 24 55.9	3.872	22	19 46 52.17	2.5189	20 39 8.6	3.158
23	17 45 13.07	2.6147	20 28 43.8	3.724	23	19 49 23.17	2.5143	20 35 55.1	3.292
24	17 47 49.98	2.6155	S. 20 32 22.8	3.576	24	19 51 53.89	2.5096	S. 20 32 33.6	3.424

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 25.					WEDNESDAY 27.				
0	<sup>h</sup> 19 <sup>m</sup> 51 <sup>s</sup> 53.89	2.5096	S. 20° 32' 33.6"	3.424	0	<sup>h</sup> 21 <sup>m</sup> 45 <sup>s</sup> 54.21	2.2305	S. 15° 38' 10.9"	8.368
1	19 54 24.32	2.5047	20 29 4.2	3.554	1	21 48 7.86	2.2345	15 29 46.6	8.441
2	19 56 54.46	2.4998	20 25 27.1	3.683	2	21 50 21.15	2.2184	15 21 18.0	8.519
3	19 59 24.30	2.4948	20 21 42.2	3.812	3	21 52 34.07	2.2123	15 12 45.2	8.592
4	20 1 53.84	2.4898	20 17 49.6	3.940	4	21 54 46.63	2.2064	15 4 8.2	8.651
5	20 4 23.08	2.4848	20 13 49.4	4.067	5	21 56 58.84	2.2005	14 55 27.1	8.718
6	20 6 52.02	2.4797	20 9 41.6	4.196	6	21 59 10.69	2.1946	14 46 42.0	8.785
7	20 9 20.65	2.4745	20 5 26.3	4.317	7	22 1 22.19	2.1887	14 37 52.9	8.851
8	20 11 48.96	2.4691	20 1 3.6	4.440	8	22 3 33.34	2.1828	14 28 59.9	8.914
9	20 14 16.94	2.4637	19 56 33.5	4.562	9	22 5 44.13	2.1769	14 20 3.2	8.977
10	20 16 44.60	2.4583	19 51 56.1	4.683	10	22 7 54.57	2.1711	14 11 2.7	9.039
11	20 19 11.94	2.4529	19 47 11.5	4.803	11	22 10 4.67	2.1654	14 1 58.5	9.099
12	20 21 38.95	2.4474	19 42 19.7	4.922	12	22 12 14.42	2.1597	13 52 50.8	9.158
13	20 24 5.62	2.4418	19 37 20.8	5.040	13	22 14 23.83	2.1540	13 43 39.6	9.216
14	20 26 31.96	2.4362	19 32 14.9	5.156	14	22 16 32.90	2.1483	13 34 24.9	9.274
15	20 28 57.96	2.4305	19 27 2.1	5.271	15	22 18 41.63	2.1427	13 25 6.7	9.331
16	20 31 23.62	2.4247	19 21 42.4	5.385	16	22 20 50.02	2.1371	13 15 45.2	9.385
17	20 33 48.93	2.4190	19 16 15.9	5.498	17	22 22 58.08	2.1316	13 6 20.5	9.438
18	20 36 13.90	2.4132	19 10 42.6	5.610	18	22 25 5.81	2.1261	12 56 52.6	9.491
19	20 38 38.52	2.4073	19 5 2.7	5.720	19	22 27 13.21	2.1206	12 47 21.6	9.549
20	20 41 2.78	2.4014	18 59 16.2	5.829	20	22 29 20.28	2.1152	12 37 47.5	9.593
21	20 43 26.69	2.3955	18 53 23.2	5.937	21	22 31 27.03	2.1098	12 28 10.4	9.642
22	20 45 50.24	2.3896	18 47 23.8	6.043	22	22 33 33.46	2.1045	12 18 30.4	9.691
23	20 48 13.44	2.3837	S. 18 41 18.0	6.148	23	22 35 39.57	2.0992	S. 12 8 47.5	9.738
TUESDAY 26.					THURSDAY 28.				
0	20 50 36.28	2.3777	S. 18 35 6.0	6.252	0	22 37 45.36	2.0939	S. 11 59 1.8	9.784
1	20 52 58.76	2.3716	18 28 47.8	6.355	1	22 39 50.84	2.0887	11 49 13.4	9.829
2	20 55 20.87	2.3655	18 22 23.4	6.457	2	22 41 56.01	2.0836	11 39 22.3	9.873
3	20 57 42.62	2.3594	18 15 52.9	6.557	3	22 44 0.87	2.0785	11 29 28.6	9.916
4	21 0 4.00	2.3533	18 9 16.5	6.656	4	22 46 5.43	2.0735	11 19 32.4	9.958
5	21 2 25.02	2.3472	18 2 34.2	6.754	5	22 48 9.69	2.0685	11 9 33.6	10.000
6	21 4 45.67	2.3411	17 55 46.0	6.851	6	22 50 13.65	2.0636	10 59 32.4	10.040
7	21 7 5.95	2.3349	17 48 52.1	6.945	7	22 52 17.32	2.0587	10 49 28.8	10.079
8	21 9 25.86	2.3288	17 41 52.6	7.039	8	22 54 20.69	2.0538	10 39 22.9	10.117
9	21 11 45.40	2.3227	17 34 47.4	7.132	9	22 56 23.77	2.0490	10 29 14.8	10.154
10	21 14 4.58	2.3166	17 27 36.7	7.223	10	22 58 26.57	2.0443	10 19 4.5	10.190
11	21 16 23.39	2.3104	17 20 20.6	7.312	11	23 0 29.09	2.0397	10 8 52.0	10.225
12	21 18 41.83	2.3042	17 12 59.2	7.401	12	23 2 31.33	2.0350	9 58 37.5	10.259
13	21 20 59.90	2.2980	17 5 32.5	7.489	13	23 4 33.29	2.0304	9 48 21.0	10.292
14	21 23 17.59	2.2918	16 58 0.5	7.576	14	23 6 34.98	2.0258	9 38 2.5	10.325
15	21 25 34.91	2.2856	16 50 23.4	7.660	15	23 8 36.40	2.0213	9 27 42.0	10.357
16	21 27 51.86	2.2794	16 42 41.3	7.744	16	23 10 37.55	2.0170	9 17 19.6	10.387
17	21 30 8.44	2.2732	16 34 54.1	7.827	17	23 12 38.44	2.0127	9 6 55.5	10.416
18	21 32 24.65	2.2671	16 27 2.0	7.908	18	23 14 39.07	2.0084	8 56 29.7	10.444
19	21 34 40.49	2.2610	16 19 5.1	7.987	19	23 16 39.45	2.0041	8 46 2.2	10.472
20	21 36 55.97	2.2549	16 11 3.5	8.066	20	23 18 39.57	1.9999	8 35 33.0	10.500
21	21 39 11.08	2.2488	16 2 57.2	8.143	21	23 20 39.44	1.9958	8 25 2.2	10.527
22	21 41 25.82	2.2427	15 54 46.3	8.220	22	23 22 39.07	1.9918	8 14 29.8	10.553
23	21 43 40.20	2.2366	15 46 30.8	8.295	23	23 24 38.46	1.9878	8 3 56.0	10.575
24	21 45 54.21	2.2305	S. 15 38 10.9	8.368	24	23 26 37.61	1.9839	S. 7 53 20.8	10.598

GREENWICH MEAN TIME.									
THE MOON'S RIGHT ASCENSION AND DECLINATION.									
Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 29.					SUNDAY, JULY 1.				
0	<sup>h</sup> 23 <sup>m</sup> 26 <sup>s</sup> 37.61	1.9839	S. 7° 53' 20".8	10.598	0	<sup>h</sup> 0 <sup>m</sup> 58 <sup>s</sup> 27.66	1.8669	N. 0° 48' 7".5	10.867
1	23 28 36.53	1.9800	7 42 44.2	10.621	PHASES OF THE MOON.				
2	23 30 35.21	1.9761	7 32 6.2	10.643					
3	23 32 33.66	1.9723	7 21 27.0	10.664					
4	23 34 31.89	1.9686	7 10 46.5	10.685					
5	23 36 29.90	1.9650	7 0 4.8	10.704					
6	23 38 27.69	1.9614	6 49 22.0	10.723					
7	23 40 25.27	1.9579	6 38 38.1	10.741					
8	23 42 22.64	1.9544	6 27 53.1	10.757					
9	23 44 19.80	1.9510	6 17 7.2	10.773					
10	23 46 16.76	1.9476	6 6 20.3	10.789					
11	23 48 13.52	1.9443	5 55 32.5	10.804	☾ Last Quarter. . . June 1 0 53.3 ● New Moon . . . . . 9 4 34.0 ☽ First Quarter . . . . 16 18 49.7 ○ Full Moon . . . . . 23 9 7.5 ☾ Last Quarter. . . . . 30 15 52.6				
12	23 50 10.08	1.9411	5 44 43.8	10.818					
13	23 52 6.45	1.9380	5 33 54.3	10.831					
14	23 54 2.64	1.9349	5 23 4.1	10.844					
15	23 55 58.64	1.9318	5 12 13.1	10.856					
16	23 57 54.46	1.9289	5 1 21.4	10.867					
17	23 59 50.11	1.9260	4 50 29.1	10.877					
18	0 1 45.58	1.9231	4 39 36.2	10.886					
19	0 3 40.88	1.9203	4 28 42.8	10.895					
20	0 5 36.02	1.9176	4 17 48.8	10.904	☾ Apogee. . . . . June 5 21.2 ☾ Perigee. . . . . 21 12.1				
21	0 7 31.00	1.9150	4 6 54.3	10.912					
22	0 9 25.82	1.9124	3 55 59.4	10.918					
23	0 11 20.48	1.9098	S. 3 45 4.2	10.923					
SATURDAY 30.									
0	0 13 14.99	1.9073	S. 3 34 8.6	10.928					
1	0 15 9.36	1.9049	3 23 12.7	10.933					
2	0 17 3.58	1.9025	3 12 16.6	10.938					
3	0 18 57.66	1.9003	3 1 20.2	10.942					
4	0 20 51.61	1.8981	2 50 23.6	10.944					
5	0 22 45.43	1.8959	2 39 26.9	10.946					
6	0 24 39.11	1.8937	2 28 30.1	10.947					
7	0 26 32.67	1.8917	2 17 33.2	10.948					
8	0 28 26.11	1.8897	2 6 36.3	10.948					
9	0 30 19.43	1.8878	1 55 39.4	10.947					
10	0 32 12.64	1.8859	1 44 42.6	10.947					
11	0 34 5.74	1.8841	1 33 45.8	10.946					
12	0 35 58.73	1.8824	1 22 49.1	10.943					
13	0 37 51.62	1.8807	1 11 52.6	10.940					
14	0 39 44.41	1.8790	1 0 56.3	10.936					
15	0 41 37.10	1.8774	0 50 0.3	10.932					
16	0 43 29.70	1.8760	0 39 4.5	10.928					
17	0 45 22.22	1.8746	0 28 9.0	10.922					
18	0 47 14.65	1.8732	0 17 13.9	10.915					
19	0 49 7.00	1.8718	S. 0 6 19.2	10.908					
20	0 50 59.27	1.8706	N. 0 4 35.1	10.901					
21	0 52 51.47	1.8694	0 15 29.0	10.894					
22	0 54 43.60	1.8683	0 26 22.4	10.885					
23	0 56 35.66	1.8672	0 37 15.2	10.876					
24	0 58 27.66	1.8662	N. 0 48 7.5	10.867					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
1	Antares	W.	92° 27' 16"	2897	93° 59' 39"	2911	95° 31' 44"	2924	97° 3' 32"	2936
	α Aquilæ	W.	50 47 49	2905	52 1 4	2874	53 14 50	2847	54 29 4	2822
	α Arietis	E.	56 29 55	2973	55 1 13	2996	53 32 58	3119	52 5 11	3143
	SUN	E.	90 25 30	2905	88 59 27	3220	87 33 41	3234	86 8 12	3247
2	α Aquilæ	W.	60 45 37	2737	62 1 45	2796	63 18 5	2715	64 34 36	2706
	α Arietis	E.	44 53 35	2971	43 28 50	2900	42 4 38	3331	40 41 2	3364
	SUN	E.	79 4 41	3311	77 40 42	3222	76 16 56	3332	74 53 22	3244
3	α Aquilæ	W.	70 59 16	2675	72 16 30	2671	73 33 48	2667	74 51 10	2665
	Fomalhaut	W.	36 6 21	2731	37 22 35	2690	38 39 33	2653	39 57 10	2622
	α Pegasi	W.	27 24 29	2781	28 12 2	2516	29 2 35	2988	29 55 51	2692
	SUN	E.	67 58 25	2389	66 35 56	2397	65 13 36	2404	63 51 24	2410
4	α Aquilæ	W.	81 18 31	2658	82 36 3	2658	83 53 35	2658	85 11 7	2658
	Fomalhaut	W.	46 32 39	2507	47 52 55	2491	49 13 29	2475	50 34 21	2469
	α Pegasi	W.	34 54 56	2421	35 59 58	2330	37 6 23	2449	38 14 3	2176
	SUN	E.	57 2 10	2439	55 40 38	2444	54 19 11	2447	52 57 47	2450
5	Fomalhaut	W.	57 22 12	2405	58 44 23	2396	60 6 44	2387	61 29 15	2378
	α Pegasi	W.	44 7 43	2906	45 20 57	2865	46 34 52	2829	47 49 24	2795
	SUN	E.	46 11 43	2463	44 50 38	2465	43 29 35	2466	42 8 33	2468
6	Fomalhaut	W.	68 24 5	2342	69 47 28	2336	71 10 58	2330	72 34 35	2323
	α Pegasi	W.	54 10 7	2659	55 27 38	2637	56 45 32	2617	58 3 48	2598
	SUN	E.	35 23 39	2470	34 2 41	2469	32 41 42	2470	31 20 44	2470
7	Fomalhaut	W.	79 34 29	2294	80 58 48	2288	82 23 13	2282	83 47 45	2277
	α Pegasi	W.	64 40 2	2516	66 0 8	2502	67 20 30	2488	68 41 7	2478
	SUN	E.	24 35 55	2472	23 15 0	2473	21 54 6	2475	20 33 14	2479
11	SUN	W.	20 26 39	2279	21 51 15	2263	23 16 10	2247	24 41 23	2234
	Regulus	E.	47 1 19	2874	45 28 27	2866	43 55 25	2859	42 22 14	2852
	MARS	E.	93 5 16	2969	91 34 24	2962	90 3 23	2954	88 32 12	2946
	Spica	E.	100 54 44	2905	99 22 31	2897	97 50 8	2889	96 17 35	2880
12	SUN	W.	31 51 14	2174	33 17 54	2163	34 44 48	2152	36 11 55	2140
	Regulus	E.	34 33 49	2613	32 59 38	2605	31 25 16	2797	29 50 44	2788
	MARS	E.	80 53 54	2908	79 21 45	2899	77 49 25	2891	76 16 55	2883
	Spica	E.	88 32 8	2838	86 58 30	2831	85 24 42	2822	83 50 43	2813
13	SUN	W.	43 30 53	2085	44 59 21	2073	46 28 3	2063	47 56 58	2052
	MARS	E.	68 31 43	2641	66 58 8	2631	65 24 21	2623	63 50 23	2614
	Spica	E.	75 57 57	2769	74 22 49	2760	72 47 29	2752	71 11 58	2743
	JUPITER	E.	112 27 0	2707	110 50 29	2697	109 13 45	2688	107 36 49	2678
14	SUN	W.	55 25 4	2294	56 55 24	2282	58 25 59	2270	59 56 49	2258
	Pollux	W.	27 53 58	2690	29 28 0	2793	31 2 37	2769	32 37 45	2747
	SATURN	W.	15 2 42	2691	16 39 34	2680	18 16 41	2669	19 54 2	2658
	MARS	E.	55 57 39	2769	54 22 31	2760	52 47 11	2751	51 11 39	2741
	Spica	E.	63 11 22	2697	61 34 38	2688	59 57 42	2679	58 20 34	2670
	JUPITER	E.	99 26 50	2628	97 50 33	2618	96 12 2	2607	94 33 16	2598

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Dist.	XVh.	P. L. of Dist.	XVIIIh.	P. L. of Dist.	XXIh.	P. L. of Dist.
1	Antares W.	98° 35' 3"	2951	100° 6' 17"	2963	101° 37' 16"	2975	103° 8' 0"	2987
	α Aquilæ W.	55 43 43	3801	56 58 44	3789	58 14 5	3786	59 29 43	3750
	α Arietis E.	50 37 53	3166	49 11 3	3191	47 44 43	3216	46 18 53	3243
	SUN E.	84 42 50	3961	83 18 2	3275	81 53 21	3287	80 28 54	3299
2	α Aquilæ W.	65 51 17	3698	67 8 6	3691	68 25 3	3684	69 42 7	3679
	α Arietis E.	39 18 4	3399	37 55 46	3436	36 34 10	3477	35 13 20	3599
	SUN E.	73 30 1	3354	72 6 52	3363	70 43 53	3379	69 21 4	3380
3	α Aquilæ W.	76 8 34	3663	77 26 1	3661	78 43 30	3660	80 1 0	3659
	Fomalhaut W.	41 15 21	3594	42 34 2	3569	43 53 10	3546	45 12 43	3525
	α Pegasi W.	30 51 35	4990	31 49 34	4771	32 49 34	4639	33 51 25	4594
	SUN E.	62 29 19	3417	61 7 22	3493	59 45 32	3499	58 23 48	3434
4	α Aquilæ W.	86 28 39	3859	87 46 10	3860	89 3 40	3862	90 21 8	3863
	Fomalhaut W.	51 55 28	3449	53 16 49	3437	54 38 24	3425	56 0 12	3415
	α Pegasi W.	39 22 52	4110	40 32 44	4051	41 43 33	3999	42 55 14	3950
	SUN E.	51 36 27	3454	50 15 11	3457	48 53 59	3460	47 32 50	3469
5	Fomalhaut W.	62 51 56	3371	64 14 46	3384	65 37 44	3357	67 0 50	3349
	α Pegasi W.	49 4 31	3764	50 20 11	3734	51 36 22	3708	52 53 1	3692
	SUN E.	40 47 33	3469	39 26 34	3469	38 5 35	3470	36 44 37	3470
6	Fomalhaut W.	73 58 20	3317	75 22 12	3311	76 46 11	3305	78 10 17	3300
	α Pegasi W.	59 22 25	3579	60 41 22	3569	62 0 38	3545	63 20 12	3531
	SUN E.	29 59 46	3470	28 38 48	3470	27 17 50	3470	25 56 52	3471
7	Fomalhaut W.	85 12 23	3272	86 37 7	3267	88 1 57	3263	89 26 52	3256
	α Pegasi W.	70 1 58	3463	71 23 3	3452	72 44 21	3441	74 5 51	3431
	SUN E.	19 12 26	3464	17 51 44	3492	16 31 11	3504	15 10 51	3522
11	SUN W.	26 6 52	3291	27 32 36	3299	28 58 34	3197	30 24 47	3185
	Regulus E.	40 48 53	2844	39 15 22	2836	37 41 41	2828	36 7 50	2821
	MARS E.	87 0 52	2939	85 29 22	2931	83 57 42	2924	82 25 53	2916
	Spica E.	94 44 51	2872	93 11 56	2864	91 38 51	2855	90 5 35	2848
12	SUN W.	37 39 16	3199	39 6 50	3118	40 34 38	3107	42 2 39	3096
	Regulus E.	28 16 1	2781	26 41 8	2773	25 6 5	2766	23 30 53	2760
	MARS E.	74 44 14	2874	73 11 22	2866	71 38 20	2858	70 5 7	2849
	Spica E.	82 16 32	2805	80 42 10	2796	79 7 37	2788	77 32 53	2779
13	SUN W.	49 26 7	3040	50 55 30	3029	52 25 7	3018	53 54 58	3005
	MARS E.	62 16 13	2805	60 41 52	2796	59 7 19	2788	57 32 35	2779
	Spica E.	69 36 15	2724	68 0 20	2725	66 24 13	2716	64 47 54	2706
	JUPITER E.	105 59 40	2669	104 22 18	2658	102 44 42	2649	101 6 53	2638
14	SUN W.	61 27 54	2946	62 59 14	2935	64 30 49	2922	66 2 40	2909
	Pollux W.	34 13 23	2725	35 49 29	2706	37 26 1	2687	39 2 58	2669
	SATURN W.	21 31 38	2647	23 9 29	2636	24 47 35	2625	26 25 56	2614
	MARS E.	49 35 54	2739	47 59 57	2724	46 23 49	2715	44 47 29	2706
	Spica E.	56 43 14	2661	55 5 42	2652	53 27 57	2643	51 50 1	2635
	JUPITER E.	92 54 16	2586	91 15 2	2574	89 35 32	2564	87 55 47	2553

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
14	Antares	E.	109° 5' 0"	9709	107° 28' 32"	9698	105° 51' 49"	9687	104° 14' 51"	9675
15	SUN	W.	67 34 47	9897	69 7 9	9885	70 39 48	9872	72 12 43	9859
	POLLUX	W.	40 40 19	9852	42 18 3	9835	43 56 10	9818	45 34 40	9803
	SATURN	W.	28 4 32	9609	29 43 24	9591	31 22 32	9579	33 1 56	9567
	MARS	E.	43 10 57	9697	41 34 13	9689	39 57 18	9681	38 20 12	9673
	Spica	E.	50 11 53	9696	48 33 34	9618	46 55 3	9610	45 16 21	9601
	JUPITER	E.	86 15 47	9541	84 35 31	9530	82 55 0	9519	81 14 13	9508
	Antares	E.	96 6 5	9617	94 27 33	9605	92 48 45	9593	91 9 41	9581
16	SUN	W.	80 1 28	9794	81 36 4	9780	83 10 58	9767	84 46 9	9754
	POLLUX	W.	53 52 26	9587	55 33 1	9513	57 13 56	9499	58 55 11	9485
	SATURN	W.	41 23 2	9507	43 4 5	9494	44 45 26	9482	46 27 4	9470
	Regulus	W.	17 42 30	9497	19 23 48	9480	21 5 29	9465	22 47 32	9450
	MARS	E.	30 12 19	9643	28 34 22	9640	26 56 22	9639	25 18 20	9640
	Spica	E.	37 0 25	9579	35 20 51	9568	33 41 12	9566	32 1 30	9566
	JUPITER	E.	72 46 19	9449	71 3 54	9438	69 21 13	9426	67 38 15	9414
	Antares	E.	82 50 16	9532	81 9 34	9511	79 28 36	9499	77 47 22	9488
17	SUN	W.	92 46 27	9687	94 23 24	9674	96 0 39	9660	97 38 12	9647
	POLLUX	W.	67 26 18	9416	69 9 30	9403	70 53 1	9389	72 36 51	9377
	SATURN	W.	54 59 37	9408	56 43 1	9396	58 26 42	9383	60 10 41	9371
	Regulus	W.	31 22 48	9392	33 6 49	9388	34 51 9	9355	36 35 48	9343
	JUPITER	E.	58 59 12	9355	57 14 33	9343	55 29 36	9331	53 44 22	9320
	Antares	E.	69 17 9	9431	67 34 19	9490	65 51 13	9410	64 7 52	9399
18	SUN	W.	105 50 23	9583	107 29 42	9570	109 9 18	9558	110 49 11	9546
	POLLUX	W.	81 20 36	9314	83 6 15	9302	84 52 12	9290	86 38 26	9279
	SATURN	W.	68 55 2	9310	70 40 47	9298	72 26 49	9287	74 13 8	9276
	Regulus	W.	45 23 37	9281	47 10 5	9269	48 56 50	9257	50 43 53	9245
	JUPITER	E.	44 54 8	9266	43 7 18	9256	41 20 13	9245	39 32 53	9236
	Antares	E.	55 27 30	9352	53 42 46	9344	51 57 50	9336	50 12 43	9330
19	SUN	W.	119 12 39	9490	120 54 6	9480	122 35 48	9469	124 17 45	9459
	SATURN	W.	83 8 47	9292	84 56 42	9212	86 44 51	9202	88 33 15	9194
	Regulus	W.	59 43 17	9192	61 31 57	9189	63 20 52	9179	65 10 2	9163
	JUPITER	E.	30 32 59	9198	28 44 28	9192	26 55 49	9189	25 7 5	9187
	Antares	E.	41 25 4	9309	39 39 17	9309	37 53 30	9311	36 7 46	9314
	α Aquilæ	E.	89 27 31	9775	87 52 31	9767	86 17 20	9760	84 41 59	9754
20	Regulus	W.	74 19 9	9122	76 9 34	9116	78 0 9	9109	79 50 54	9103
	MARS	W.	26 17 5	9309	28 2 52	9291	29 49 5	9275	31 35 41	9262
	Spica	W.	21 29 13	9370	23 13 31	9398	24 58 50	9294	26 44 59	9265
	α Aquilæ	E.	76 44 4	9749	75 8 29	9753	73 33 0	9760	71 57 39	9768
21	Regulus	W.	89 6 37	9082	90 58 4	9080	92 49 34	9078	94 41 7	9077
	MARS	W.	40 32 40	9220	42 20 38	9214	44 8 44	9210	45 56 57	9206
	Spica	W.	35 44 15	9178	37 33 16	9167	39 22 33	9158	41 12 3	9151
	α Aquilæ	E.	64 4 36	9845	62 31 6	9869	60 58 7	9896	59 25 43	9297
	Fomalhaut	E.	96 12 40	9309	94 26 53	9304	92 41 0	9302	90 55 3	9300
22	Regulus	W.	103 59 4	9080	105 50 34	9082	107 42 1	9085	109 33 24	9088

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
14	Antares E.	102° 37' 37"	2663	101° 0' 7"	2652	99° 22' 22"	2640	97° 44' 21"	2629
15	SUN W.	73 45 55	2645	75 19 24	2633	76 53 9	2621	78 27 10	2606
	Pollux W.	47 13 32	2637	48 52 45	2579	50 32 18	2557	52 12 12	2543
	SATURN W.	34 41 36	2555	36 21 33	2543	38 1 46	2531	39 42 16	2520
	MARS E.	36 42 56	2666	35 5 30	2658	33 27 54	2652	31 50 10	2647
	Spica E.	43 37 28	2594	41 58 25	2588	40 19 13	2582	38 39 53	2576
	JUPITER E.	79 33 11	2497	77 51 53	2485	76 10 18	2473	74 28 27	2461
	Antares E.	89 30 20	2509	87 50 43	2558	86 10 50	2546	84 30 41	2535
16	SUN W.	86 21 37	2741	87 57 23	2737	89 33 27	2714	91 9 48	2701
	Pollux W.	60 36 45	2471	62 18 39	2457	64 0 53	2443	65 43 26	2430
	SATURN W.	48 8 59	2458	49 51 12	2445	51 33 43	2433	53 16 31	2420
	Regulus W.	24 29 56	2436	26 12 40	2422	27 55 43	2408	29 39 6	2395
	MARS E.	23 40 19	2643	22 2 23	2652	20 24 39	2667	18 47 15	2680
	Spica E.	30 21 48	2568	28 42 9	2572	27 2 36	2580	25 23 13	2591
	JUPITER E.	65 55 0	2402	64 11 28	2390	62 27 39	2379	60 43 34	2367
	Antares E.	76 5 52	2477	74 24 6	2465	72 42 3	2453	70 59 44	2442
17	SUN W.	99 16 3	2634	100 54 12	2621	102 32 38	2608	104 11 22	2596
	Pollux W.	74 20 59	2364	76 5 26	2351	77 50 11	2338	79 35 15	2326
	SATURN W.	61 54 58	2359	63 39 32	2346	65 24 24	2334	67 9 34	2322
	Regulus W.	38 20 45	2330	40 6 1	2317	41 51 35	2305	43 37 27	2293
	JUPITER E.	51 58 52	2309	50 13 5	2298	48 27 2	2287	46 40 43	2276
	Antares E.	62 24 16	2389	60 40 26	2379	58 56 21	2369	57 12 2	2360
18	SUN W.	112 29 20	2534	114 9 46	2522	115 50 28	2511	117 31 26	2500
	Pollux W.	88 24 57	2268	90 11 44	2256	91 58 48	2246	93 46 7	2236
	SATURN W.	75 59 43	2264	77 46 35	2253	79 33 43	2243	81 21 7	2233
	Regulus W.	52 31 13	2234	54 18 50	2223	56 6 43	2212	57 54 52	2202
	JUPITER E.	37 45 19	2227	35 57 32	2218	34 9 32	2211	32 21 21	2204
	Antares E.	48 27 27	2394	46 42 2	2218	44 56 29	2213	43 10 49	2210
19	SUN W.	125 59 56	2450	127 42 20	2441	129 24 56	2433	131 7 43	2426
	SATURN W.	90 21 52	2184	92 10 43	2176	93 59 47	2168	95 49 3	2161
	Regulus W.	66 59 26	2154	68 49 3	2145	70 38 53	2137	72 28 55	2130
	JUPITER E.	23 18 18	2187	21 29 31	2190	19 40 48	2197	17 52 16	2211
	Antares E.	34 22 7	2290	32 36 37	2329	30 51 20	2349	29 6 22	2360
	α Aquilæ E.	83 6 31	2750	81 30 57	2747	79 55 20	2747	78 19 42	2747
20	Regulus W.	81 41 48	2098	83 32 50	2094	85 23 59	2089	87 15 15	2085
	MARS W.	33 22 36	2251	35 9 47	2241	36 57 13	2233	38 44 51	2226
	Spica W.	28 31 50	2241	30 19 16	2232	32 7 11	2224	33 55 32	2219
	α Aquilæ E.	70 22 29	2779	68 47 33	2791	67 12 53	2805	65 38 33	2824
21	Regulus W.	96 32 42	2075	98 24 19	2075	100 15 56	2077	102 7 31	2078
	MARS W.	47 45 15	2204	49 33 37	2202	51 22 1	2202	53 10 26	2202
	Spica W.	43 1 44	2145	44 51 34	2141	46 41 31	2137	48 31 34	2135
	α Aquilæ E.	57 53 58	2982	56 22 57	3001	54 52 46	3046	53 23 30	3096
	Fomalhaut E.	89 9 4	2300	87 23 5	2300	85 37 6	2302	83 51 9	2304
22	Regulus W.	111 24 42	2092	113 15 53	2098	115 6 56	2104	116 57 49	2111



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
22	MARS	W.	54° 58' 51"	9309	56° 47' 15"	9303	58° 35' 37"	9306	60° 23' 55"	9310
	Spica	W.	50 21 40	9134	52 11 48	9133	54 1 57	9134	55 52 5	9135
	α Aquilæ	E.	51 55 15	9151	50 28 7	9213	49 2 13	9289	47 37 41	9361
	Fomalhaut	E.	82 5 16	9308	80 19 29	9313	78 33 49	9390	76 48 18	9396
	α Pegasi	E.	97 43 37	9456	96 1 22	9456	94 19 7	9458	92 36 54	9460
23	MARS	W.	69 23 52	9236	71 11 26	9244	72 58 48	9252	74 45 58	9260
	Spica	W.	65 1 47	9155	66 51 23	9161	68 40 49	9169	70 30 4	9176
	JUPITER	W.	29 21 22	9125	31 11 43	9126	33 1 59	9134	34 52 7	9139
	Antares	W.	20 20 7	9531	22 0 37	9477	23 42 23	9436	25 25 6	9405
	Fomalhaut	E.	68 3 57	9389	66 19 56	9397	64 36 17	9414	62 53 2	9431
	α Pegasi	E.	84 7 22	9494	82 26 0	9504	80 44 52	9516	79 4 1	9530
24	MARS	W.	83 38 17	9314	85 23 56	9326	87 9 17	9339	88 54 19	9353
	Spica	W.	79 33 7	9225	81 20 58	9236	83 8 32	9249	84 55 47	9261
	JUPITER	W.	44 0 2	9189	45 48 56	9194	47 37 33	9205	49 25 53	9217
	Antares	W.	34 6 18	9346	35 51 11	9344	37 36 6	9345	39 21 0	9348
	Fomalhaut	E.	54 23 56	9548	52 43 50	9578	51 4 25	9610	49 25 44	9646
	α Pegasi	E.	70 45 6	9618	69 6 36	9641	67 28 37	9666	65 51 11	9691
25	MARS	W.	97 34 21	9498	99 17 16	9444	100 59 48	9461	102 41 56	9478
	Spica	W.	93 47 10	9339	95 32 23	9348	97 17 13	9364	99 1 40	9380
	JUPITER	W.	58 22 48	9285	60 9 10	9200	61 55 10	9215	63 40 47	9231
	Antares	W.	48 3 34	9386	49 47 29	9397	51 31 8	9409	53 14 30	9421
	Fomalhaut	E.	41 25 28	9573	39 52 34	9531	38 20 55	9507	36 50 39	9470
	α Pegasi	E.	57 53 25	9650	56 20 2	9688	54 47 28	9730	53 15 47	9773
	α Arietis	E.	99 48 49	9455	98 6 33	9460	96 24 36	9463	94 42 59	9469
26	JUPITER	W.	72 23 5	9412	74 6 22	9430	75 49 14	9448	77 31 41	9465
	Antares	W.	61 46 43	9491	63 28 9	9507	65 9 13	9522	66 49 55	9538
	α Pegasi	E.	45 52 27	9350	44 27 17	9319	43 3 27	9394	41 41 4	9477
	α Arietis	E.	86 20 30	9583	84 41 11	9601	83 2 17	9619	81 23 48	9636
27	JUPITER	W.	85 57 52	9552	87 37 53	9570	89 17 29	9588	90 56 41	9605
	Antares	W.	75 7 50	9621	76 46 16	9636	78 24 20	9655	80 2 1	9679
	α Aquilæ	W.	38 26 6	4557	39 29 8	4435	40 33 58	4398	41 40 25	4334
	α Arietis	E.	73 17 54	9738	71 42 4	9759	70 6 42	9780	68 31 48	9801
	SUN	E.	132 42 20	9896	131 9 56	9915	129 37 56	9933	128 6 19	9959
28	JUPITER	W.	99 6 48	9690	100 43 41	9707	102 20 11	9723	103 56 20	9740
	Antares	W.	88 4 46	9756	89 40 12	9779	91 15 17	9788	92 50 0	9805
	α Aquilæ	W.	47 31 24	3917	48 44 27	3874	49 58 13	3837	51 12 37	3804
	α Arietis	E.	60 44 23	9913	59 12 21	9937	57 40 49	9966	56 9 48	9996
	SUN	E.	120 34 3	3043	119 4 43	3060	117 35 45	3078	116 7 9	3095
29	α Aquilæ	W.	57 31 48	3894	58 48 41	3880	60 5 49	3868	61 23 10	3858
	α Arietis	E.	48 42 35	3119	47 14 48	3148	45 47 36	3176	44 21 0	3210
	SUN	E.	108 49 11	3177	107 22 34	3192	105 56 15	3207	104 30 14	3221
30	α Aquilæ	W.	67 52 6	3698	69 10 10	3695	70 28 17	3693	71 46 27	3699
	Fomalhaut	W.	32 54 43	3792	34 10 4	3798	35 26 21	3809	36 43 27	3843
	SUN	E.	97 24 17	3288	95 59 52	3300	94 35 41	3312	93 11 43	3322

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Dist.	XVh.	P. L. of Dist.	XVIIIh.	P. L. of Dist.	XXIh.	P. L. of Dist.
22	MARS W.	62° 12' 8"	9214	64° 0' 15"	9218	65° 46' 15"	9223	67° 36' 8"	9229
	Spica W.	57 42 11	9137	59 32 13	9140	61 22 11	9144	63 12 3	9149
	α Aquilæ E.	46 14 40	9448	44 53 18	9545	43 33 44	9655	42 16 9	9779
	Fomalhaut E.	75 2 57	9235	73 17 49	9245	71 32 55	9256	69 48 17	9368
	α Pegasi E.	90 54 45	9464	89 12 41	9469	87 30 44	9476	85 48 57	9485
23	MARS W.	76 32 56	9270	78 19 40	9280	80 6 9	9291	81 52 21	9309
	Spica W.	73 19 8	9184	74 7 59	9193	75 56 37	9203	77 45 0	9214
	JUPITER W.	36 42 6	9147	38 31 54	9155	40 21 30	9163	42 10 53	9178
	Antares W.	27 8 33	9383	28 52 32	9388	30 36 53	9397	32 21 30	9409
	Fomalhaut E.	61 10 12	9451	59 27 50	9473	57 45 59	9486	56 4 40	9521
	α Pegasi E.	77 23 29	9545	75 43 18	9561	74 3 29	9578	72 24 4	9598
24	MARS W.	90 39 1	9368	92 23 22	9389	94 7 23	9396	95 51 3	9419
	Spica W.	86 42 44	9274	88 29 22	9298	90 15 39	9309	92 1 35	9317
	JUPITER W.	51 13 55	9230	53 1 38	9243	54 49 2	9257	56 36 5	9270
	Antares W.	41 5 49	9353	42 50 31	9359	44 35 4	9368	46 19 25	9376
	Fomalhaut E.	47 47 51	9694	46 10 49	9794	44 34 41	9769	42 59 32	9818
	α Pegasi E.	64 14 19	9719	62 38 4	9749	61 2 29	9780	59 27 35	9814
25	MARS W.	104 23 40	9495	106 5 0	9519	107 45 56	9530	109 26 27	9549
	Spica W.	100 45 44	9396	102 29 25	9413	104 12 41	9431	105 55 32	9448
	JUPITER W.	65 26 1	9347	67 10 52	9363	68 55 20	9380	70 39 24	9396
	Antares W.	54 57 35	9433	56 40 22	9448	58 22 49	9469	60 4 56	9476
	Fomalhaut E.	35 21 53	9152	33 54 46	9244	32 29 29	9347	31 6 12	9465
	α Pegasi E.	51 45 1	9391	50 15 14	9379	48 46 30	9387	47 18 53	9395
	α Arietis E.	93 1 44	9515	91 20 51	9530	89 40 20	9548	88 0 13	9565
26	JUPITER W.	79 13 44	9489	80 55 23	9499	82 36 37	9517	84 17 27	9535
	Antares W.	68 30 15	9554	70 10 13	9571	71 49 48	9588	73 29 0	9604
	α Pegasi E.	40 20 14	9567	39 1 4	9606	37 43 41	9775	36 28 13	9896
	α Arietis E.	79 45 44	9657	78 8 6	9677	76 30 55	9697	74 54 11	9717
27	JUPITER W.	92 35 29	9692	94 13 54	9640	95 51 55	9657	97 29 33	9674
	Antares W.	81 39 19	9699	83 16 14	9705	84 52 47	9722	86 28 58	9739
	α Aquilæ W.	42 48 19	4153	43 57 30	4099	45 7 49	4090	46 19 9	3964
	α Arietis E.	66 57 22	9893	65 23 24	9845	63 49 55	9867	62 16 54	9891
	SUN E.	126 35 6	9970	125 4 16	9989	123 33 49	3007	122 3 45	3095
28	JUPITER W.	105 32 7	9756	107 7 33	9771	108 42 39	9787	110 17 24	9809
	Antares W.	94 24 22	9820	95 58 24	9836	97 32 5	9852	99 5 25	9868
	α Aquilæ W.	52 27 35	3775	53 43 3	3751	54 58 56	3729	56 15 12	3710
	α Arietis E.	54 39 18	3011	53 9 19	3036	51 39 51	3063	50 10 56	3091
	SUN E.	114 38 53	3112	113 10 58	3129	111 43 23	3144	110 16 7	3161
29	α Aquilæ W.	62 40 42	3649	63 58 23	3643	65 16 11	3636	66 34 6	3639
	α Arietis E.	42 55 3	3243	41 29 45	3279	40 5 9	3316	38 41 16	3356
	SUN E.	103 4 30	3236	101 39 3	3249	100 13 52	3263	98 48 57	3276
30	α Aquilæ W.	73 4 38	3622	74 22 49	3622	75 41 0	3622	76 59 11	3623
	Fomalhaut W.	38 1 15	3609	39 19 40	3578	40 38 38	3551	41 58 6	3528
	SUN E.	91 47 57	3333	90 24 24	3344	89 1 3	3353	87 37 53	3398

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.			
SUN.	1	<sup>h</sup> 6 <sup>m</sup> 43 <sup>s</sup> 31.51	10.333	N.23° 4' 29.4"	-10.74	15' 46".12	68.76	3 38.49	0.476
Mon.	2	6 47 39.38	10.322	22 59 59.4	11.75	15 46.11	68.72	3 49.78	0.465
Tues.	3	6 51 46.99	10.311	22 55 5.4	12.75	15 46.11	68.68	4 0.80	0.454
Wed.	4	6 55 54.31	10.298	22 49 47.4	-13.74	15 46.11	68.63	4 11.54	0.441
Thur.	5	7 0 1.32	10.285	22 44 5.6	14.73	15 46.11	68.58	4 21.96	0.428
Frid.	6	7 4 7.99	10.270	22 38 0.1	15.71	15 46.12	68.53	4 32.04	0.413
Sat.	7	7 8 14.30	10.255	22 31 31.1	-16.69	15 46.14	68.48	4 41.77	0.398
SUN.	8	7 12 20.24	10.239	22 24 38.7	17.66	15 46.17	68.43	4 51.13	0.382
Mon.	9	7 16 25.77	10.222	22 17 23.0	18.63	15 46.20	68.37	5 0.08	0.365
Tues.	10	7 20 30.89	10.204	22 9 44.3	-19.58	15 46.23	68.31	5 8.61	0.347
Wed.	11	7 24 35.55	10.185	22 1 42.7	20.53	15 46.27	68.25	5 16.69	0.328
Thur.	12	7 28 39.74	10.165	21 53 18.4	21.47	15 46.32	68.19	5 24.30	0.308
Frid.	13	7 32 43.46	10.145	21 44 31.6	-22.41	15 46.37	68.12	5 31.44	0.288
Sat.	14	7 36 46.68	10.124	21 35 22.5	23.33	15 46.43	68.05	5 38.08	0.267
SUN.	15	7 40 49.38	10.102	21 25 51.3	24.25	15 46.49	67.98	5 44.21	0.245
Mon.	16	7 44 51.55	10.080	21 15 58.4	-25.15	15 46.55	67.91	5 49.81	0.223
Tues.	17	7 48 53.17	10.057	21 5 43.8	26.05	15 46.62	67.83	5 54.87	0.200
Wed.	18	7 52 54.24	10.033	20 55 7.7	26.93	15 46.69	67.76	5 59.38	0.177
Thur.	19	7 56 54.76	10.009	20 44 10.4	-27.81	15 46.77	67.68	6 3.33	0.153
Frid.	20	8 0 54.71	9.986	20 32 52.3	28.68	15 46.85	67.60	6 6.72	0.130
Sat.	21	8 4 54.09	9.962	20 21 13.5	29.54	15 46.94	67.52	6 9.53	0.106
SUN.	22	8 8 52.89	9.938	20 9 14.3	-30.38	15 47.03	67.44	6 11.77	0.082
Mon.	23	8 12 51.11	9.914	19 56 54.8	31.22	15 47.12	67.36	6 13.42	0.058
Tues.	24	8 16 48.74	9.890	19 44 15.4	32.04	15 47.21	67.28	6 14.50	0.034
Wed.	25	8 20 45.79	9.865	19 31 16.3	-32.86	15 47.31	67.19	6 14.99	0.009
Thur.	26	8 24 42.25	9.841	19 17 57.8	33.66	15 47.41	67.11	6 14.90	0.015
Frid.	27	8 28 38.12	9.816	19 4 20.1	34.45	15 47.51	67.02	6 14.22	0.040
Sat.	28	8 32 33.41	9.792	18 50 23.5	-35.24	15 47.62	66.94	6 12.96	0.064
SUN.	29	8 36 28.12	9.768	18 36 8.3	36.02	15 47.73	66.85	6 11.12	0.088
Mon.	30	8 40 22.24	9.744	18 21 34.7	36.77	15 47.84	66.76	6 8.69	0.112
Tues.	31	8 44 15.77	9.719	18 6 43.0	37.52	15 47.96	66.67	6 5.67	0.137
Wed.	32	8 48 8.71	9.695	N.17 51 33.5	-38.26	15 48.08	66.59	6 2.06	0.161

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.19 from the sideral time.

The sign — prefixed to the hourly change of declination indicates that north declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Subtracted from Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
SUN.	1	6 43 30.88	10.332	N. 23 4 30.1	-10.74	3 38.46	0.476	6 39 52.42
Mon.	2	6 47 38.72	10.321	23 0 0.2	11.75	3 49.75	0.465	6 43 48.97
Tues.	3	6 51 46.30	10.310	22 55 6.3	12.75	4 0.77	0.454	6 47 45.53
Wed.	4	6 55 53.59	10.297	22 49 48.4	-13.74	4 11.51	0.441	6 51 42.08
Thur.	5	7 0 0.57	10.284	22 44 6.7	14.73	4 21.93	0.428	6 55 38.64
Frid.	6	7 4 7.21	10.269	22 38 1.3	15.71	4 32.01	0.413	6 59 35.20
Sat.	7	7 8 13.50	10.254	22 31 32.4	-16.69	4 41.74	0.398	7 3 31.76
SUN.	8	7 12 19.41	10.238	22 24 40.1	17.66	4 51.10	0.382	7 7 28.31
Mon.	9	7 16 24.92	10.221	22 17 24.5	18.63	5 0.05	0.365	7 11 24.87
Tues.	10	7 20 30.01	10.203	22 9 45.9	-19.58	5 8.58	0.347	7 15 21.43
Wed.	11	7 24 34.65	10.184	22 1 44.4	20.53	5 16.66	0.328	7 19 17.99
Thur.	12	7 28 38.82	10.164	21 53 20.3	21.47	5 24.27	0.308	7 23 14.55
Frid.	13	7 32 42.52	10.144	21 44 33.6	-22.41	5 31.41	0.288	7 27 11.11
Sat.	14	7 36 45.72	10.123	21 35 24.6	23.33	5 38.06	0.267	7 31 7.66
SUN.	15	7 40 48.41	10.101	21 25 53.6	24.25	5 44.19	0.245	7 35 4.22
Mon.	16	7 44 50.56	10.079	21 16 0.8	-25.15	5 49.79	0.223	7 39 0.77
Tues.	17	7 48 52.18	10.056	21 5 46.3	26.05	5 54.85	0.200	7 42 57.33
Wed.	18	7 52 53.25	10.033	20 55 10.3	26.93	5 59.36	0.177	7 46 53.88
Thur.	19	7 56 53.76	10.009	20 44 13.2	-27.81	6 3.32	0.153	7 50 50.44
Frid.	20	8 0 53.70	9.986	20 32 55.2	28.68	6 6.71	0.130	7 54 46.99
Sat.	21	8 4 53.07	9.962	20 21 16.5	29.54	6 9.52	0.106	7 58 43.55
SUN.	22	8 8 51.87	9.938	20 9 17.4	-30.38	6 11.76	0.082	8 2 40.11
Mon.	23	8 12 50.08	9.914	19 56 58.0	31.22	6 13.41	0.058	8 6 36.67
Tues.	24	8 16 47.71	9.890	19 44 18.7	32.04	6 14.49	0.034	8 10 33.22
Wed.	25	8 20 44.76	9.865	19 31 19.7	-32.86	6 14.98	0.009	8 14 29.78
Thur.	26	8 24 41.22	9.841	19 18 1.3	33.66	6 14.89	0.015	8 18 26.33
Frid.	27	8 28 37.10	9.816	19 4 23.7	34.45	6 14.22	0.040	8 22 22.89
Sat.	28	8 32 32.40	9.792	18 50 27.2	-35.24	6 12.96	0.064	8 26 19.44
SUN.	29	8 36 27.11	9.768	18 36 12.0	36.01	6 11.12	0.088	8 30 16.00
Mon.	30	8 40 21.24	9.744	18 21 38.4	36.77	6 8.69	0.112	8 34 12.55
Tues.	31	8 44 14.78	9.719	18 6 46.8	37.52	6 5.67	0.137	8 38 9.11
Wed.	32	8 48 7.73	9.695	N. 17 51 37.4	-38.26	6 2.07	0.161	8 42 5.66

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign -- prefixed to the hourly change of declination indicates that north declinations are decreasing.

Diff. for 1 hour,  
+9<sup>m</sup>.8565.  
(Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	183	100° 0' 16.3	0' 5.9	142.99	— 0.82	0.0072281	+ 2.1	<sup>h</sup> 17 <sup>m</sup> 17.19
2	184	100 57 28.1	57 17.5	143.00	0.85	0.0072322	1.2	17 13 21.27
3	185	101 54 40.2	54 29.4	143.01	0.86	0.0072341	+ 0.3	17 9 25.36
4	186	102 51 52.6	51 41.6	143.02	— 0.83	0.0072337	— 0.7	17 5 29.45
5	187	103 49 5.2	48 54.1	143.03	0.77	0.0072308	1.7	17 1 33.54
6	188	104 46 18.1	46 6.8	143.05	0.69	0.0072254	2.8	16 57 37.62
7	189	105 43 31.4	43 19.9	143.06	— 0.59	0.0072174	— 3.9	16 53 41.71
8	190	106 40 44.9	40 33.2	143.07	0.46	0.0072068	5.0	16 49 45.80
9	191	107 37 58.6	37 46.7	143.08	0.32	0.0071936	6.1	16 45 49.89
10	192	108 35 12.5	35 0.4	143.08	— 0.18	0.0071777	— 7.2	16 41 53.98
11	193	109 32 26.5	32 14.2	143.09	— 0.05	0.0071592	8.2	16 37 58.07
12	194	110 29 40.6	29 28.2	143.09	+ 0.06	0.0071382	9.3	16 34 2.16
13	195	111 26 54.9	26 42.3	143.10	+ 0.17	0.0071147	— 10.3	16 30 6.25
14	196	112 24 9.3	23 56.5	143.10	0.25	0.0070888	11.3	16 26 10.34
15	197	113 21 23.8	21 10.9	143.11	0.31	0.0070606	12.2	16 22 14.43
16	198	114 18 38.5	18 25.4	143.12	+ 0.33	0.0070303	— 13.0	16 18 18.52
17	199	115 15 53.3	15 40.1	143.13	0.32	0.0069980	13.8	16 14 22.61
18	200	116 13 8.3	12 55.0	143.14	0.28	0.0069639	14.5	16 10 26.70
19	201	117 10 23.6	10 10.2	143.15	+ 0.22	0.0069282	— 15.2	16 6 30.79
20	202	118 7 39.3	7 25.7	143.16	0.13	0.0068910	15.9	16 2 34.88
21	203	119 4 55.3	4 41.5	143.18	+ 0.02	0.0068522	16.5	15 58 38.97
22	204	120 2 11.8	1 57.8	143.20	— 0.10	0.0068119	— 17.1	15 54 43.05
23	205	120 59 28.9	59 14.8	143.23	0.23	0.0067703	17.7	15 50 47.14
24	206	121 56 46.6	56 32.4	143.26	0.36	0.0067274	18.3	15 46 51.23
25	207	122 54 5.0	53 50.6	143.29	— 0.48	0.0066831	— 18.8	15 42 55.32
26	208	123 51 24.3	51 9.7	143.33	0.59	0.0066374	19.3	15 38 59.41
27	209	124 48 44.6	48 29.9	143.37	0.67	0.0065903	19.9	15 35 3.50
28	210	125 46 5.9	45 51.1	143.41	— 0.74	0.0065418	— 20.5	15 31 7.59
29	211	126 43 28.2	43 13.3	143.45	0.77	0.0064918	21.2	15 27 11.68
30	212	127 40 51.6	40 36.5	143.50	0.78	0.0064401	21.9	15 23 15.78
31	213	128 38 16.1	38 0.8	143.55	0.76	0.0063867	22.7	15 19 19.87
32	214	129 35 41.8	35 26.4	143.60	— 0.71	0.0063313	— 23.5	15 15 23.96
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>th</sup> .								
								Diff. for 1 Hour, — 9 <sup>m</sup> . 8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

GREENWICH MEAN TIME.									
Day of the Month.	THE MOON'S								
	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
1	14 55.1	14 52.1	54 38.1	-1.03	54 27.0	-0.82	18 <sup>h</sup> 50.5 <sup>m</sup>	1.74 <sup>m</sup>	21.8 <sup>d</sup>
2	14 49.8	14 48.1	54 18.5	0.61	54 12.5	-0.40	19 32.5	1.76	22.8
3	14 47.1	14 46.8	54 8.9	-0.20	54 7.7	0.00	20 15.4	1.82	23.8
4	14 47.1	14 48.0	54 8.8	+0.18	54 12.1	+0.35	20 59.8	1.89	24.8
5	14 49.4	14 51.4	54 17.3	0.51	54 24.4	0.66	21 46.2	1.98	25.8
6	14 53.8	14 56.5	54 33.2	0.79	54 43.4	0.90	22 34.8	2.07	26.8
7	14 59.6	15 3.1	54 54.8	+1.00	55 7.4	+1.08	23 25.2	2.13	27.8
8	15 6.7	15 10.6	55 20.8	1.15	55 34.9	1.20	0 6		28.8
9	15 14.5	15 18.6	55 49.5	1.23	56 4.4	1.25	0 16.9	2.17	0.2
10	15 22.7	15 26.9	56 19.5	+1.27	56 34.8	+1.27	1 9.0	2.17	1.2
11	15 31.0	15 35.1	56 50.0	1.26	57 5.1	1.26	2 0.8	2.14	2.2
12	15 39.2	15 43.2	57 20.1	1.24	57 34.8	1.22	2 51.8	2.10	3.2
13	15 47.2	15 51.0	57 49.3	+1.19	58 3.4	+1.16	3 41.8	2.07	4.2
14	15 54.7	15 58.4	58 17.2	1.13	58 30.6	1.09	4 31.2	2.05	5.2
15	16 1.9	16 5.2	58 43.4	1.04	58 55.6	0.99	5 20.6	2.07	6.2
16	16 8.3	16 11.2	59 7.1	+0.92	59 17.6	+0.82	6 11.0	2.13	7.2
17	16 13.7	16 15.8	59 26.8	0.71	59 34.7	0.59	7 3.0	2.22	8.2
18	16 17.6	16 18.8	59 41.0	0.45	59 45.4	+0.28	7 57.4	2.33	9.2
19	16 19.4	16 19.3	59 47.6	+0.08	59 47.4	-0.12	8 54.5	2.43	10.2
20	16 18.6	16 17.1	59 44.7	-0.34	59 39.3	0.56	9 53.6	2.49	11.2
21	16 14.9	16 12.0	59 31.2	0.79	59 20.4	1.01	10 53.6	2.49	12.2
22	16 8.3	16 4.0	59 7.0	-1.21	58 51.3	-1.40	11 52.7	2.42	13.2
23	15 59.2	15 53.8	58 33.4	1.56	58 13.8	1.69	12 49.2	2.29	14.2
24	15 48.1	15 42.1	57 52.8	1.79	57 30.9	1.85	13 42.4	2.14	15.2
25	15 36.0	15 29.9	57 8.5	-1.87	56 46.0	-1.86	14 32.1	2.00	16.2
26	15 23.9	15 18.1	56 24.0	1.81	56 2.7	1.73	15 18.6	1.88	17.2
27	15 12.6	15 7.6	55 42.5	1.62	55 23.9	1.48	16 2.9	1.81	18.2
28	15 3.0	14 58.9	55 7.0	-1.32	54 52.2	-1.14	16 45.7	1.76	19.2
29	14 55.5	14 52.7	54 39.6	0.95	54 29.4	0.75	17 28.0	1.76	20.2
30	14 50.6	14 49.2	54 21.7	0.53	54 16.6	-0.32	18 10.6	1.79	21.2
31	14 48.5	14 48.5	54 14.0	-0.11	54 14.0	+0.11	18 54.3	1.85	22.2
32	14 49.2	14 50.6	54 16.6	+0.32	54 21.6	+0.52	19 39.7	1.94	23.2

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for Minute.	Declination.	Diff. for Minute.	Hour.	Right Ascension.	Diff. for Minute.	Declination.	Diff. for Minute.
SUNDAY 1.					TUESDAY 3.				
0	<sup>h</sup> 0 <sup>m</sup> 58 <sup>s</sup> 27.66	1.8662	N. 0 48 7.5	10.867	0	<sup>h</sup> 2 <sup>m</sup> 27 <sup>s</sup> 57.29	1.8837	N. 9 7 56.3	9.745
1	1 0 19.60	1.8652	0 58 59.2	10.857	1	2 29 50.36	1.8853	9 17 39.9	9.707
2	1 2 11.49	1.8643	1 9 50.3	10.846	2	2 31 43.53	1.8870	9 27 21.2	9.669
3	1 4 3.32	1.8634	1 20 40.7	10.834	3	2 33 36.80	1.8887	9 37 0.2	9.631
4	1 5 55.10	1.8627	1 31 30.4	10.822	4	2 35 30.17	1.8904	9 46 36.9	9.592
5	1 7 46.84	1.8620	1 42 19.4	10.810	5	2 37 23.65	1.8922	9 56 11.2	9.552
6	1 9 38.54	1.8613	1 53 7.6	10.797	6	2 39 17.24	1.8941	10 5 43.2	9.512
7	1 11 30.20	1.8607	2 3 55.0	10.783	7	2 41 10.94	1.8960	10 15 12.7	9.472
8	1 13 21.83	1.8602	2 14 41.6	10.769	8	2 43 4.76	1.8980	10 24 39.8	9.431
9	1 15 13.42	1.8597	2 25 27.3	10.754	9	2 44 58.70	1.9000	10 34 4.4	9.389
10	1 17 4.99	1.8592	2 36 12.1	10.739	10	2 46 52.76	1.9020	10 43 26.5	9.347
11	1 18 56.53	1.8589	2 46 56.0	10.723	11	2 48 46.94	1.9041	10 52 46.0	9.304
12	1 20 48.05	1.8586	2 57 38.9	10.707	12	2 50 41.25	1.9062	11 2 2.9	9.260
13	1 22 39.56	1.8583	3 8 20.8	10.690	13	2 52 35.69	1.9084	11 11 17.2	9.216
14	1 24 31.05	1.8581	3 19 1.7	10.672	14	2 54 30.26	1.9107	11 20 28.8	9.171
15	1 26 22.53	1.8580	3 29 41.5	10.654	15	2 56 24.97	1.9129	11 29 37.7	9.125
16	1 28 14.01	1.8579	3 40 20.2	10.635	16	2 58 19.81	1.9151	11 38 43.8	9.079
17	1 30 5.48	1.8578	3 50 57.7	10.616	17	3 0 14.78	1.9174	11 47 47.2	9.033
18	1 31 56.95	1.8579	4 1 34.1	10.597	18	3 2 9.89	1.9198	11 56 47.8	8.986
19	1 33 48.43	1.8580	4 12 9.3	10.578	19	3 4 5.15	1.9223	12 5 45.5	8.938
20	1 35 39.91	1.8581	4 22 43.2	10.555	20	3 6 0.56	1.9247	12 14 40.3	8.889
21	1 37 31.40	1.8583	4 33 15.9	10.534	21	3 7 56.11	1.9271	12 23 32.2	8.840
22	1 39 22.91	1.8586	4 43 47.3	10.512	22	3 9 51.81	1.9297	12 32 21.1	8.790
23	1 41 14.43	1.8589	N. 4 54 17.3	10.489	23	3 11 47.67	1.9322	N. 12 41 7.0	8.740
MONDAY 2.					WEDNESDAY 4				
0	1 43 5.97	1.8593	N. 5 4 46.0	10.466	0	3 13 43.68	1.9348	N. 12 49 49.9	8.689
1	1 44 57.54	1.8597	5 15 13.3	10.442	1	3 15 39.85	1.9375	12 58 29.7	8.637
2	1 46 49.13	1.8601	5 25 39.1	10.417	2	3 17 36.18	1.9401	13 7 6.4	8.585
3	1 48 40.75	1.8606	5 36 3.4	10.392	3	3 19 32.66	1.9427	13 15 39.9	8.532
4	1 50 32.41	1.8612	5 46 26.2	10.367	4	3 21 29.30	1.9454	13 24 10.2	8.478
5	1 52 24.10	1.8618	5 56 47.5	10.342	5	3 23 26.11	1.9482	13 32 37.3	8.425
6	1 54 15.83	1.8625	6 7 7.3	10.317	6	3 25 23.09	1.9511	13 41 1.2	8.371
7	1 56 7.60	1.8633	6 17 25.5	10.289	7	3 27 20.24	1.9539	13 49 21.8	8.315
8	1 57 59.42	1.8641	6 27 42.0	10.261	8	3 29 17.56	1.9567	13 57 39.0	8.259
9	1 59 51.29	1.8649	6 37 56.8	10.232	9	3 31 15.04	1.9595	14 5 52.8	8.202
10	2 1 43.21	1.8658	6 48 9.9	10.204	10	3 33 12.70	1.9624	14 14 3.2	8.144
11	2 3 35.19	1.8667	6 58 21.3	10.176	11	3 35 10.53	1.9653	14 22 10.1	8.087
12	2 5 27.22	1.8677	7 8 31.0	10.147	12	3 37 8.54	1.9683	14 30 13.6	8.028
13	2 7 19.31	1.8688	7 18 38.9	10.116	13	3 39 6.73	1.9713	14 38 13.5	7.968
14	2 9 11.47	1.8699	7 28 44.9	10.084	14	3 41 5.10	1.9743	14 46 9.8	7.909
15	2 11 3.70	1.8711	7 38 49.0	10.053	15	3 43 3.65	1.9773	14 54 2.6	7.849
16	2 12 56.00	1.8723	7 48 51.2	10.021	16	3 45 2.36	1.9804	15 1 51.7	7.787
17	2 14 48.37	1.8735	7 58 51.5	9.988	17	3 47 1.30	1.9836	15 9 37.0	7.724
18	2 16 40.82	1.8748	8 8 49.8	9.955	18	3 49 0.41	1.9867	15 17 18.6	7.662
19	2 18 33.35	1.8762	8 18 46.1	9.921	19	3 50 59.71	1.9898	15 24 56.5	7.599
20	2 20 25.96	1.8776	8 28 40.3	9.887	20	3 52 59.19	1.9929	15 32 30.5	7.535
21	2 22 18.66	1.8790	8 38 32.5	9.852	21	3 54 58.86	1.9961	15 40 0.7	7.471
22	2 24 11.44	1.8805	8 48 22.6	9.817	22	3 56 58.72	1.9993	15 47 27.0	7.406
23	2 26 4.32	1.8821	8 58 10.5	9.781	23	3 58 58.78	2.0026	15 54 49.4	7.340
24	2 27 57.29	1.8837	N. 9 7 56.3	9.745	24	4 0 59.03	2.0058	N. 16 2 7.8	7.273

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 5.					SATURDAY 7.				
0	4 0 59.03	2.0058	N.16° 2' 7.8"	7.273	0	5 41 7.01	2.1643	N.20° 21' 53.6"	3.301
1	4 2 59.47	2.0090	16 9 22.2	7.306	1	5 43 16.96	2.1672	20 25 8.7	3.303
2	4 5 0.11	2.0133	16 16 32.5	7.138	2	5 45 27.08	2.1702	20 28 17.9	3.104
3	4 7 0.95	2.0156	16 23 38.8	7.070	3	5 47 37.38	2.1731	20 31 21.2	3.006
4	4 9 1.99	2.0189	16 30 40.9	7.000	4	5 49 47.85	2.1760	20 34 18.6	2.906
5	4 11 3.22	2.0232	16 37 38.8	6.930	5	5 51 58.50	2.1789	20 37 9.9	2.805
6	4 13 4.65	2.0256	16 44 32.5	6.860	6	5 54 9.32	2.1817	20 39 55.2	2.704
7	4 15 6.29	2.0289	16 51 22.0	6.789	7	5 56 20.30	2.1844	20 42 34.4	2.603
8	4 17 8.12	2.0322	16 58 7.2	6.716	8	5 58 31.44	2.1871	20 45 7.6	2.502
9	4 19 10.15	2.0355	17 4 48.0	6.643	9	6 0 42.75	2.1898	20 47 34.7	2.400
10	4 21 12.38	2.0389	17 11 24.4	6.570	10	6 2 54.22	2.1924	20 49 55.6	2.297
11	4 23 14.82	2.0423	17 17 56.4	6.497	11	6 5 5.84	2.1950	20 52 10.3	2.194
12	4 25 17.46	2.0457	17 24 24.0	6.429	12	6 7 17.62	2.1976	20 54 18.9	2.091
13	4 27 20.31	2.0491	17 30 47.1	6.347	13	6 9 29.56	2.2002	20 56 21.2	1.987
14	4 29 23.36	2.0525	17 37 5.6	6.271	14	6 11 41.64	2.2026	20 58 17.3	1.882
15	4 31 26.61	2.0559	17 43 19.6	6.195	15	6 13 53.87	2.2050	21 0 7.1	1.777
16	4 33 30.07	2.0593	17 49 29.0	6.117	16	6 16 6.24	2.2074	21 1 50.6	1.672
17	4 35 33.73	2.0627	17 55 33.7	6.038	17	6 18 18.76	2.2098	21 3 27.7	1.566
18	4 37 37.60	2.0662	18 1 33.6	5.959	18	6 20 31.42	2.2122	21 4 58.5	1.460
19	4 39 41.67	2.0696	18 7 28.8	5.881	19	6 22 44.22	2.2144	21 6 22.9	1.353
20	4 41 45.95	2.0730	18 13 19.3	5.802	20	6 24 57.15	2.2166	21 7 40.9	1.246
21	4 43 50.43	2.0764	18 19 5.0	5.721	21	6 27 10.21	2.2187	21 8 52.5	1.139
22	4 45 55.12	2.0798	18 24 45.8	5.639	22	6 29 23.40	2.2209	21 9 57.6	1.031
23	4 48 0.01	2.0832	N.18° 30' 21.7"	5.557	23	6 31 36.72	2.2230	N.21° 10' 56.2"	0.924
FRIDAY 6.					SUNDAY 8.				
0	4 50 5.10	2.0866	N.18° 35' 52.6"	5.474	0	6 33 50.16	2.2250	N.21° 11' 48.4"	0.816
1	4 52 10.40	2.0900	18 41 18.6	5.391	1	6 36 3.72	2.2270	21 12 34.1	0.707
2	4 54 15.90	2.0934	18 46 39.5	5.307	2	6 38 17.40	2.2289	21 13 13.2	0.597
3	4 56 21.61	2.0968	18 51 55.4	5.222	3	6 40 31.19	2.2307	21 13 45.8	0.488
4	4 58 27.52	2.1002	18 57 6.2	5.137	4	6 42 45.09	2.2326	21 14 11.8	0.378
5	5 0 33.63	2.1035	19 2 11.9	5.052	5	6 44 59.10	2.2344	21 14 31.2	0.268
6	5 2 39.94	2.1068	19 7 12.4	4.965	6	6 47 13.22	2.2362	21 14 44.0	0.158
7	5 4 46.45	2.1102	19 12 7.7	4.877	7	6 49 27.44	2.2378	21 14 50.2	+ 0.047
8	5 6 53.16	2.1136	19 16 57.7	4.789	8	6 51 41.76	2.2394	21 14 49.7	- 0.063
9	5 9 0.08	2.1169	19 21 42.4	4.701	9	6 53 56.17	2.2409	21 14 42.6	0.174
10	5 11 7.19	2.1202	19 26 21.8	4.612	10	6 56 10.67	2.2424	21 14 28.8	0.285
11	5 13 14.50	2.1235	19 30 55.9	4.523	11	6 58 25.26	2.2439	21 14 8.4	0.396
12	5 15 22.01	2.1267	19 35 24.6	4.433	12	7 0 39.94	2.2453	21 13 41.3	0.507
13	5 17 29.71	2.1300	19 39 47.8	4.341	13	7 2 54.70	2.2467	21 13 7.5	0.619
14	5 19 37.61	2.1332	19 44 5.5	4.249	14	7 5 9.54	2.2480	21 12 27.0	0.732
15	5 21 45.70	2.1364	19 48 17.7	4.157	15	7 7 24.46	2.2492	21 11 39.7	0.844
16	5 23 53.98	2.1396	19 52 24.4	4.065	16	7 9 39.45	2.2504	21 10 45.7	0.956
17	5 26 2.45	2.1429	19 56 25.5	3.971	17	7 11 54.51	2.2515	21 9 45.0	1.068
18	5 28 11.12	2.1461	20 0 20.9	3.877	18	7 14 9.63	2.2526	21 8 37.5	1.181
19	5 30 19.98	2.1492	20 4 10.7	3.782	19	7 16 24.82	2.2537	21 7 23.3	1.293
20	5 32 29.02	2.1522	20 7 54.8	3.687	20	7 18 40.07	2.2546	21 6 2.3	1.406
21	5 34 38.24	2.1552	20 11 33.2	3.592	21	7 20 55.37	2.2554	21 4 34.6	1.518
22	5 36 47.65	2.1583	20 15 5.8	3.495	22	7 23 10.72	2.2563	21 3 0.1	1.631
23	5 38 57.24	2.1613	20 18 32.6	3.398	23	7 25 26.12	2.2571	21 1 18.9	1.744
24	5 41 7.01	2.1643	N.20° 21' 53.6"	3.301	24	7 27 41.57	2.2578	N.20° 59' 30.9"	1.857



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 9.					WEDNESDAY 11.				
0	7 27 41.57	2.9578	N.20 59 30.9	1.857	0	9 15 56.77	2.9360	N.17 23 9.1	7.038
1	7 29 57.06	2.9585	20 57 36.1	1.989	1	9 18 10.89	2.9346	17 16 3.9	7.136
2	7 32 12.59	2.9592	20 55 34.6	2.069	2	9 20 24.92	2.9339	17 8 52.8	7.333
3	7 34 28.16	2.9597	20 53 26.3	2.185	3	9 22 38.67	2.9318	17 1 35.9	7.330
4	7 36 43.76	2.9602	20 51 11.2	2.308	4	9 24 52.74	2.9304	16 54 13.2	7.498
5	7 38 59.39	2.9607	20 48 49.3	2.421	5	9 27 6.52	2.9289	16 46 44.8	7.581
6	7 41 15.05	2.9612	20 46 20.7	2.533	6	9 29 20.21	2.9274	16 39 10.7	7.615
7	7 43 30.73	2.9615	20 43 45.3	2.646	7	9 31 33.81	2.9260	16 31 31.0	7.709
8	7 45 46.43	2.9618	20 41 3.2	2.758	8	9 33 47.33	2.9246	16 23 45.6	7.803
9	7 48 2.14	2.9620	20 38 14.3	2.871	9	9 36 0.76	2.9231	16 15 54.6	7.896
10	7 50 17.87	2.9622	20 35 18.6	2.984	10	9 38 14.10	2.9216	16 7 58.1	7.987
11	7 52 33.60	2.9623	20 32 16.2	3.096	11	9 40 27.35	2.9201	15 59 56.2	8.077
12	7 54 49.34	2.9624	20 29 7.1	3.209	12	9 42 40.51	2.9186	15 51 48.8	8.168
13	7 57 5.09	2.9624	20 25 51.2	3.321	13	9 44 53.58	2.9170	15 43 36.0	8.258
14	7 59 20.83	2.9623	20 22 28.6	3.433	14	9 47 6.55	2.9154	15 35 17.8	8.346
15	8 1 36.57	2.9623	20 18 59.4	3.543	15	9 49 19.43	2.9139	15 26 54.4	8.434
16	8 3 52.31	2.9622	20 15 23.5	3.654	16	9 51 32.22	2.9124	15 18 25.7	8.522
17	8 6 8.04	2.9621	20 11 40.9	3.766	17	9 53 44.92	2.9108	15 9 51.7	8.610
18	8 8 23.76	2.9618	20 7 51.6	3.877	18	9 55 57.52	2.9092	15 1 12.5	8.696
19	8 10 39.46	2.9615	20 3 55.7	3.987	19	9 58 10.03	2.9077	14 52 28.2	8.781
20	8 12 55.14	2.9612	19 59 53.1	4.098	20	10 0 22.45	2.9062	14 43 38.8	8.865
21	8 15 10.81	2.9609	19 55 43.9	4.208	21	10 2 34.77	2.9046	14 34 44.4	8.948
22	8 17 26.45	2.9605	19 51 28.1	4.318	22	10 4 47.00	2.9031	14 25 45.0	9.031
23	8 19 42.07	2.9601	N.19 47 5.7	4.428	23	10 6 59.14	2.9016	N.14 16 40.6	9.113
TUESDAY 10.					THURSDAY 12.				
0	8 21 57.66	2.9595	N.19 42 36.7	4.537	0	10 9 11.19	2.9000	N.14 7 31.4	9.194
1	8 24 13.21	2.9589	19 38 1.2	4.647	1	10 11 23.14	2.1984	13 58 17.3	9.275
2	8 26 28.73	2.9584	19 33 19.1	4.756	2	10 13 35.00	2.1969	13 48 58.4	9.355
3	8 28 44.22	2.9578	19 28 30.5	4.864	3	10 15 46.77	2.1954	13 39 34.7	9.434
4	8 30 59.67	2.9571	19 23 35.4	4.973	4	10 17 58.45	2.1939	13 30 6.3	9.512
5	8 33 15.07	2.9563	19 18 33.8	5.080	5	10 20 10.04	2.1924	13 20 33.3	9.589
6	8 35 30.43	2.9556	19 13 25.8	5.187	6	10 22 21.54	2.1909	13 10 55.7	9.665
7	8 37 45.74	2.9548	19 8 11.3	5.294	7	10 24 32.95	2.1894	13 1 13.5	9.741
8	8 40 1.00	2.9539	19 2 50.5	5.400	8	10 26 44.27	2.1880	12 51 26.8	9.815
9	8 42 16.21	2.9531	18 57 23.3	5.507	9	10 28 55.51	2.1866	12 41 35.7	9.888
10	8 44 31.37	2.9522	18 51 49.7	5.613	10	10 31 6.66	2.1851	12 31 40.2	9.961
11	8 46 46.47	2.9512	18 46 9.8	5.718	11	10 33 17.72	2.1836	12 21 40.3	10.033
12	8 49 1.51	2.9502	18 40 23.6	5.823	12	10 35 28.69	2.1822	12 11 36.2	10.104
13	8 51 16.49	2.9492	18 34 31.1	5.927	13	10 37 39.58	2.1808	12 1 27.8	10.175
14	8 53 31.41	2.9482	18 28 32.4	6.030	14	10 39 50.39	2.1794	11 51 15.2	10.244
15	8 55 46.27	2.9471	18 22 27.5	6.132	15	10 42 1.11	2.1781	11 40 58.5	10.312
16	8 58 1.06	2.9459	18 16 16.5	6.235	16	10 44 11.76	2.1768	11 30 37.7	10.380
17	9 0 15.78	2.9448	18 9 59.3	6.338	17	10 46 22.33	2.1755	11 20 12.9	10.447
18	9 2 30.43	2.9436	18 3 35.9	6.441	18	10 48 32.82	2.1742	11 9 44.1	10.513
19	9 4 45.01	2.9423	17 57 6.4	6.543	19	10 50 43.23	2.1729	10 59 11.4	10.578
20	9 6 59.51	2.9411	17 50 30.9	6.642	20	10 52 53.57	2.1717	10 48 34.8	10.642
21	9 9 13.94	2.9398	17 43 49.4	6.743	21	10 55 3.84	2.1705	10 37 54.4	10.704
22	9 11 28.20	2.9386	17 37 1.9	6.841	22	10 57 14.03	2.1693	10 27 10.3	10.766
23	9 13 42.57	2.9373	17 30 8.5	6.940	23	10 59 24.15	2.1682	10 16 22.5	10.827
24	9 15 56.77	2.9360	N.17 23 9.1	7.038	24	11 1 34.21	2.1671	N.10 5 31.1	10.887

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 13.					SUNDAY 15.				
0	h m s	s	N. 10° 5 31.1"	10.887	0	h m s	s	N. 0° 32' 25.9"	12.583
1	11 3 44.20	2.1659	9 54 36.1	10.947	1	12 45 1.18	2.1609	0 19 50.0	12.603
2	11 5 54.12	2.1648	9 43 37.5	11.005	2	12 47 10.87	2.1621	0 7 13.6	12.611
3	11 8 3.98	2.1638	9 32 35.5	11.062	3	12 49 20.63	2.1632	S. 0 5 23.3	12.618
4	11 10 13.78	2.1628	9 21 30.1	11.118	4	12 51 30.46	2.1644	0 18 0.6	12.624
5	11 12 23.52	2.1619	9 10 21.3	11.174	5	12 53 40.36	2.1657	0 30 38.2	12.628
6	11 14 33.21	2.1610	8 59 9.2	11.228	6	12 55 50.34	2.1670	0 43 16.0	12.632
7	11 16 42.84	2.1601	8 47 53.9	11.282	7	12 58 0.40	2.1684	0 55 54.0	12.634
8	11 18 52.42	2.1592	8 36 35.4	11.334	8	13 0 10.55	2.1698	1 8 32.1	12.636
9	11 21 1.94	2.1584	8 25 13.8	11.386	9	13 2 20.78	2.1712	1 21 10.3	12.637
10	11 23 11.42	2.1576	8 13 49.1	11.437	10	13 4 31.10	2.1726	1 33 48.5	12.638
11	11 25 20.85	2.1568	8 2 21.4	11.486	11	13 6 41.52	2.1744	1 46 26.6	12.633
12	11 27 30.23	2.1560	7 50 50.8	11.534	12	13 8 52.03	2.1760	1 59 4.5	12.630
13	11 29 39.57	2.1554	7 39 17.3	11.582	13	13 11 2.64	2.1778	2 11 42.2	12.626
14	11 31 48.88	2.1548	7 27 41.0	11.628	14	13 13 13.36	2.1796	2 24 19.6	12.620
15	11 33 58.15	2.1543	7 16 1.9	11.674	15	13 15 24.19	2.1814	2 36 56.6	12.613
16	11 36 7.39	2.1537	7 4 20.1	11.719	16	13 17 35.13	2.1832	2 49 33.2	12.605
17	11 38 16.59	2.1531	6 52 35.6	11.762	17	13 19 46.18	2.1851	3 2 9.2	12.595
18	11 40 25.76	2.1526	6 40 48.6	11.804	18	13 21 57.34	2.1870	3 14 44.6	12.585
19	11 42 34.90	2.1522	6 28 59.1	11.846	19	13 24 8.62	2.1891	3 27 19.4	12.573
20	11 44 44.02	2.1518	6 17 7.1	11.887	20	13 26 20.03	2.1912	3 39 53.4	12.560
21	11 46 53.12	2.1515	6 5 12.6	11.927	21	13 28 31.57	2.1934	3 52 26.6	12.546
22	11 49 2.20	2.1512	5 53 15.8	11.965	22	13 30 43.24	2.1957	4 4 58.9	12.531
23	11 51 11.27	2.1510	N. 5 41 16.8	12.002	23	13 32 55.05	2.1979	S. 4 17 30.3	12.515
SATURDAY 14.					MONDAY 16.				
0	11 53 20.32	2.1508	N. 5 29 15.6	12.038	0	13 37 19.07	2.2026	S. 4 30 0.7	12.497
1	11 55 29.36	2.1506	5 17 12.2	12.074	1	13 39 31.30	2.2050	4 42 30.0	12.478
2	11 57 38.39	2.1505	5 5 6.7	12.108	2	13 41 43.67	2.2074	4 54 58.1	12.457
3	11 59 47.42	2.1504	4 52 59.2	12.142	3	13 43 56.19	2.2100	5 7 24.9	12.436
4	12 1 56.44	2.1504	4 40 49.7	12.174	4	13 46 8.87	2.2126	5 19 50.4	12.413
5	12 4 5.47	2.1505	4 28 38.3	12.205	5	13 48 21.70	2.2152	5 32 14.5	12.389
6	12 6 14.50	2.1505	4 16 25.1	12.235	6	13 50 34.69	2.2179	5 44 37.1	12.364
7	12 8 23.53	2.1506	4 4 10.1	12.264	7	13 52 47.85	2.2207	5 56 58.2	12.337
8	12 10 32.57	2.1508	3 51 53.4	12.292	8	13 55 1.17	2.2234	6 9 17.6	12.309
9	12 12 41.63	2.1511	3 39 35.1	12.319	9	13 57 14.66	2.2263	6 21 35.3	12.281
10	12 14 50.71	2.1515	3 27 15.2	12.345	10	13 59 28.32	2.2292	6 33 51.3	12.251
11	12 16 59.81	2.1518	3 14 53.7	12.371	11	14 1 42.16	2.2321	6 46 5.4	12.218
12	12 19 8.93	2.1522	3 2 30.7	12.394	12	14 3 56.17	2.2351	6 58 17.5	12.185
13	12 21 18.07	2.1526	2 50 6.4	12.416	13	14 6 10.37	2.2380	7 10 27.6	12.152
14	12 23 27.24	2.1531	2 37 40.8	12.437	14	14 8 24.75	2.2419	7 22 35.7	12.117
15	12 25 36.44	2.1537	2 25 13.9	12.458	15	14 10 39.31	2.2443	7 34 41.6	12.080
16	12 27 45.68	2.1543	2 12 45.8	12.477	16	14 12 54.06	2.2475	7 46 45.3	12.042
17	12 29 54.95	2.1548	2 0 16.6	12.496	17	14 15 9.01	2.2507	7 58 46.6	12.002
18	12 32 4.26	2.1556	1 47 46.3	12.513	18	14 17 24.15	2.2540	8 10 45.5	11.962
19	12 34 13.62	2.1564	1 35 15.0	12.529	19	14 19 39.49	2.2573	8 22 42.0	11.920
20	12 36 23.03	2.1572	1 22 42.8	12.544	20	14 21 55.03	2.2607	8 34 35.9	11.876
21	12 38 32.49	2.1581	1 10 9.7	12.558	21	14 24 10.77	2.2641	8 46 27.1	11.831
22	12 40 42.00	2.1589	0 57 35.8	12.571	22	14 26 26.72	2.2675	8 58 15.6	11.785
23	12 42 51.56	2.1598	0 45 1.2	12.583	23	14 28 42.87	2.2709	9 10 1.3	11.738
24	12 45 1.18	2.1609	N. 0 32 25.9	12.593	24	14 30 59.23	2.2745	S. 9 21 44.2	11.690

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 17.					THURSDAY 19.				
0	14 30 59.23	2.9745	S. 9 21' 44.2"	11.690	0	16 24 41.18	2.4654	S. 17 21' 20.5"	7.784
1	14 33 15.81	2.9781	9 33 24.1	11.640	1	16 27 9.22	2.4691	17 29 4.1	7.671
2	14 35 32.60	2.9817	9 45 1.0	11.588	2	16 29 37.47	2.4727	17 36 41.0	7.557
3	14 37 49.61	2.9853	9 56 34.7	11.535	3	16 32 5.94	2.4763	17 44 11.0	7.442
4	14 40 6.84	2.9890	10 8 5.2	11.483	4	16 34 34.63	2.4800	17 51 34.0	7.325
5	14 42 24.29	2.9927	10 19 32.5	11.437	5	16 37 3.54	2.4837	17 58 50.0	7.208
6	14 44 41.96	2.9964	10 30 56.5	11.371	6	16 39 32.67	2.4873	18 5 59.0	7.090
7	14 46 59.86	2.3002	10 42 17.0	11.312	7	16 42 2.01	2.4907	18 13 0.8	6.970
8	14 49 17.99	2.3040	10 53 33.9	11.252	8	16 44 31.55	2.4941	18 19 55.4	6.849
9	14 51 36.34	2.3078	11 4 47.3	11.192	9	16 47 1.30	2.4975	18 26 42.7	6.727
10	14 53 54.92	2.3117	11 15 57.0	11.130	10	16 49 31.25	2.5008	18 33 22.7	6.605
11	14 56 13.74	2.3156	11 27 2.9	11.067	11	16 52 1.39	2.5040	18 39 55.3	6.481
12	14 58 32.79	2.3195	11 38 5.0	11.003	12	16 54 31.73	2.5073	18 46 20.4	6.356
13	15 0 52.08	2.3234	11 49 3.2	10.937	13	16 57 2.26	2.5103	18 52 38.0	6.230
14	15 3 11.60	2.3273	11 59 57.4	10.868	14	16 59 32.97	2.5133	18 58 48.0	6.103
15	15 5 31.36	2.3313	12 10 47.4	10.799	15	17 2 3.86	2.5163	19 4 50.4	5.976
16	15 7 51.36	2.3354	12 21 33.3	10.730	16	17 4 34.93	2.5193	19 10 45.1	5.847
17	15 10 11.61	2.3395	12 32 15.0	10.658	17	17 7 6.18	2.5222	19 16 32.0	5.717
18	15 12 32.10	2.3435	12 42 52.3	10.585	18	17 9 37.60	2.5250	19 22 11.2	5.587
19	15 14 52.83	2.3476	12 53 25.2	10.511	19	17 12 9.18	2.5277	19 27 42.5	5.456
20	15 17 13.81	2.3517	13 3 53.6	10.436	20	17 14 40.92	2.5303	19 33 5.9	5.324
21	15 19 35.03	2.3557	13 14 17.5	10.359	21	17 17 12.81	2.5328	19 38 21.3	5.191
22	15 21 56.50	2.3598	13 24 36.7	10.281	22	17 19 44.86	2.5353	19 43 28.8	5.057
23	15 24 18.21	2.3639	S. 13 34 51.2	10.201	23	17 22 17.05	2.5377	S. 19 48 28.2	4.922
WEDNESDAY 18.					FRIDAY 20.				
0	15 26 40.17	2.3681	S. 13 45 0.8	10.119	0	17 24 40.38	2.5399	S. 19 53 19.5	4.787
1	15 29 2.38	2.3722	13 55 5.5	10.037	1	17 27 21.84	2.5421	19 58 2.6	4.651
2	15 31 24.84	2.3764	14 5 5.3	9.954	2	17 29 54.44	2.5443	20 2 37.6	4.515
3	15 33 47.55	2.3805	14 15 0.0	9.868	3	17 32 27.16	2.5463	20 7 4.4	4.377
4	15 36 10.50	2.3846	14 24 49.5	9.782	4	17 35 0.00	2.5482	20 11 22.9	4.239
5	15 38 33.70	2.3887	14 34 33.9	9.696	5	17 37 32.95	2.5501	20 15 33.1	4.100
6	15 40 57.15	2.3929	14 44 13.0	9.607	6	17 40 6.01	2.5518	20 19 34.9	3.961
7	15 43 20.85	2.3971	14 53 46.7	9.516	7	17 42 39.17	2.5535	20 23 28.4	3.822
8	15 45 44.80	2.4012	15 3 14.9	9.423	8	17 45 12.43	2.5551	20 27 13.5	3.681
9	15 48 9.00	2.4054	15 12 37.5	9.330	9	17 47 45.78	2.5565	20 30 50.1	3.540
10	15 50 33.45	2.4095	15 21 54.5	9.237	10	17 50 19.21	2.5578	20 34 18.3	3.399
11	15 52 58.14	2.4136	15 31 5.9	9.142	11	17 52 52.72	2.5591	20 37 38.0	3.257
12	15 55 23.08	2.4177	15 40 11.5	9.045	12	17 55 26.31	2.5603	20 40 49.1	3.114
13	15 57 48.27	2.4218	15 49 11.3	8.947	13	17 57 59.96	2.5613	20 43 51.7	2.971
14	16 0 13.70	2.4258	15 58 5.1	8.847	14	18 0 33.67	2.5622	20 46 45.7	2.828
15	16 2 39.37	2.4298	16 6 52.9	8.746	15	18 3 7.43	2.5631	20 49 31.1	2.685
16	16 5 5.28	2.4339	16 15 34.6	8.644	16	18 5 41.24	2.5638	20 52 7.9	2.542
17	16 7 31.44	2.4380	16 24 10.2	8.541	17	18 8 15.09	2.5645	20 54 36.1	2.398
18	16 9 57.84	2.4420	16 32 39.5	8.436	18	18 10 48.98	2.5650	20 56 55.6	2.253
19	16 12 24.48	2.4459	16 41 2.5	8.331	19	18 13 22.89	2.5654	20 59 6.4	2.108
20	16 14 51.35	2.4498	16 49 19.2	8.224	20	18 15 56.82	2.5657	21 1 8.5	1.963
21	16 17 18.46	2.4537	16 57 29.4	8.115	21	18 18 30.77	2.5658	21 3 2.0	1.819
22	16 19 45.80	2.4576	17 5 33.0	8.006	22	18 21 4.72	2.5659	21 4 46.8	1.673
23	16 22 13.37	2.4615	17 13 30.1	7.896	23	18 23 38.68	2.5659	21 6 22.8	1.527
24	16 24 41.18	2.4654	S. 17 21 20.5	7.784	24	18 26 12.63	2.5657	S. 21 7 50.1	1.382

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff for 1 Minute.	Declination.	Diff for 1 Minute.	Hour.	Right Ascension.	Diff for 1 Minute.	Declination.	Diff for 1 Minute.
SATURDAY 21.					MONDAY 23.				
0	18 26 12.63	2.5657	S. 21° 7' 50.1"	1.382	0	20 27 7.95	2.4352	S. 19° 31' 49.4"	5.155
1	18 28 46.57	2.5655	21 9 8.7	1.237	1	20 29 33.92	2.4304	19 26 36.6	5.272
2	18 31 20.49	2.5651	21 10 18.6	1.092	2	20 31 59.60	2.4256	19 21 16.8	5.388
3	18 33 54.38	2.5646	21 11 19.7	0.946	3	20 34 24.99	2.4207	19 15 50.0	5.504
4	18 36 28.24	2.5640	21 12 12.1	0.801	4	20 36 50.08	2.4157	19 10 16.3	5.618
5	18 39 2.06	2.5634	21 12 55.8	0.655	5	20 39 14.87	2.4107	19 4 35.8	5.731
6	18 41 35.84	2.5626	21 13 30.7	0.509	6	20 41 39.36	2.4056	18 58 48.6	5.842
7	18 44 9.57	2.5616	21 13 56.9	0.365	7	20 44 3.54	2.4004	18 52 54.7	5.952
8	18 46 43.23	2.5604	21 14 14.5	0.221	8	20 46 27.41	2.3953	18 46 54.3	6.061
9	18 49 16.82	2.5592	21 14 23.4	- 0.076	9	20 48 50.98	2.3901	18 40 47.4	6.169
10	18 51 50.34	2.5581	21 14 23.6	+ 0.069	10	20 51 14.23	2.3848	18 34 34.0	6.276
11	18 54 23.79	2.5568	21 14 15.1	0.214	11	20 53 37.16	2.3795	18 28 14.3	6.381
12	18 56 57.15	2.5553	21 13 57.9	0.358	12	20 55 59.77	2.3742	18 21 48.3	6.486
13	18 59 30.42	2.5536	21 13 32.1	0.502	13	20 58 22.06	2.3688	18 15 16.0	6.589
14	19 2 3.58	2.5518	21 12 57.7	0.646	14	21 0 44.03	2.3635	18 8 37.6	6.691
15	19 4 36.63	2.5499	21 12 14.6	0.789	15	21 3 5.68	2.3581	18 1 53.1	6.792
16	19 7 9.57	2.5481	21 11 23.0	0.932	16	21 5 27.00	2.3526	17 55 2.5	6.892
17	19 9 42.40	2.5461	21 10 22.8	1.074	17	21 7 47.99	2.3472	17 48 6.0	6.990
18	19 12 15.10	2.5439	21 9 14.1	1.216	18	21 10 8.66	2.3417	17 41 3.7	7.087
19	19 14 47.66	2.5416	21 7 56.9	1.357	19	21 12 29.00	2.3362	17 33 55.6	7.183
20	19 17 20.09	2.5392	21 6 31.2	1.499	20	21 14 49.00	2.3306	17 26 41.7	7.278
21	19 19 52.37	2.5367	21 4 57.0	1.640	21	21 17 8.67	2.3250	17 19 22.2	7.372
22	19 22 24.50	2.5342	21 3 14.4	1.780	22	21 19 28.00	2.3194	17 11 57.1	7.464
23	19 24 56.47	2.5315	S. 21° 1' 23.4"	1.919	23	21 21 47.00	2.3139	S. 17° 4' 26.5"	7.555
SUNDAY 22.					TUESDAY 24.				
0	19 27 28.28	2.5287	S. 20° 50' 24.1"	2.057	0	21 24 5.67	2.3083	S. 16° 56' 50.5"	7.644
1	19 29 59.92	2.5258	20 57 16.5	2.196	1	21 26 24.00	2.3027	16 49 9.2	7.732
2	19 32 31.38	2.5228	20 55 0.6	2.334	2	21 28 41.99	2.2971	16 41 22.6	7.820
3	19 35 2.65	2.5197	20 52 36.4	2.472	3	21 30 59.65	2.2915	16 33 30.8	7.906
4	19 37 33.74	2.5166	20 50 4.0	2.608	4	21 33 16.97	2.2858	16 25 33.9	7.991
5	19 40 4.64	2.5132	20 47 23.5	2.743	5	21 35 33.95	2.2802	16 17 31.9	8.074
6	19 42 35.33	2.5098	20 44 34.9	2.878	6	21 37 50.59	2.2745	16 9 25.0	8.156
7	19 45 5.82	2.5064	20 41 38.2	3.012	7	21 40 6.89	2.2689	16 1 13.2	8.237
8	19 47 36.10	2.5029	20 38 33.5	3.145	8	21 42 22.86	2.2633	15 52 56.6	8.317
9	19 50 6.17	2.4993	20 35 20.8	3.277	9	21 44 38.49	2.2577	15 44 35.2	8.395
10	19 52 36.02	2.4956	20 32 0.2	3.409	10	21 46 53.78	2.2520	15 36 9.2	8.472
11	19 55 5.64	2.4917	20 28 31.7	3.540	11	21 49 8.73	2.2464	15 27 38.6	8.548
12	19 57 35.02	2.4877	20 24 55.4	3.670	12	21 51 23.35	2.2408	15 19 3.4	8.623
13	20 0 4.17	2.4838	20 21 11.3	3.799	13	21 53 37.63	2.2352	15 10 23.8	8.697
14	20 2 33.08	2.4798	20 17 19.5	3.927	14	21 55 51.58	2.2297	15 1 39.8	8.768
15	20 5 1.75	2.4757	20 13 20.0	4.055	15	21 58 5.19	2.2241	14 52 51.6	8.838
16	20 7 30.16	2.4714	20 9 12.9	4.181	16	22 0 18.47	2.2185	14 43 59.2	8.908
17	20 9 58.32	2.4671	20 4 58.3	4.306	17	22 2 31.41	2.2129	14 35 2.6	8.977
18	20 12 26.22	2.4628	20 0 36.2	4.431	18	22 4 44.02	2.2074	14 26 1.9	9.045
19	20 14 53.86	2.4584	19 56 6.6	4.555	19	22 6 56.30	2.2019	14 16 57.2	9.111
20	20 17 21.23	2.4539	19 51 29.6	4.677	20	22 9 8.25	2.1964	14 7 48.6	9.175
21	20 19 48.33	2.4493	19 46 45.4	4.798	21	22 11 19.87	2.1910	13 58 36.2	9.238
22	20 22 15.15	2.4447	19 41 53.9	4.918	22	22 13 31.17	2.1856	13 49 20.0	9.301
23	20 24 41.69	2.4400	19 36 55.2	5.037	23	22 15 42.14	2.1801	13 40 0.1	9.362
24	20 27 7.95	2.4352	S. 19° 31' 49.4"	5.155	24	22 17 52.78	2.1747	S. 13° 30' 36.5"	9.422

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 25.					FRIDAY 27.				
0	22 17 52.78	2.1747	S. 13 30' 36.5"	9.492	0	23 56 45.46	1.9631	S. 5 10' 11.3"	11.042
1	22 20 3.10	2.1693	13 21 9.4	9.481	1	23 58 43.15	1.9590	4 59 8.5	11.062
2	22 22 13.10	2.1640	13 11 38.8	9.530	2	0 40 40.65	1.9568	4 48 5.1	11.082
3	22 24 22.78	2.1587	13 2 4.7	9.506	3	0 2 37.96	1.9537	4 37 1.1	11.071
4	22 26 32.14	2.1534	12 52 27.3	9.651	4	0 4 35.09	1.9507	4 25 56.6	11.079
5	22 28 41.19	2.1482	12 42 46.6	9.705	5	0 6 32.04	1.9478	4 14 51.6	11.087
6	22 30 49.92	2.1430	12 33 2.7	9.758	6	0 8 28.82	1.9449	4 3 46.2	11.093
7	22 32 58.34	2.1377	12 23 15.6	9.810	7	0 10 25.43	1.9421	3 52 40.4	11.099
8	22 35 6.45	2.1326	12 13 25.5	9.860	8	0 12 21.87	1.9393	3 41 34.3	11.104
9	22 37 14.25	2.1274	12 3 32.4	9.910	9	0 14 18.14	1.9366	3 30 27.9	11.109
10	22 39 21.74	2.1223	11 53 36.3	9.958	10	0 16 14.26	1.9340	3 19 21.2	11.112
11	22 41 28.93	2.1173	11 43 37.4	10.005	11	0 18 10.22	1.9313	3 8 14.4	11.115
12	22 43 35.82	2.1123	11 33 35.7	10.052	12	0 20 6.02	1.9287	2 57 7.4	11.117
13	22 45 42.41	2.1073	11 23 31.2	10.097	13	0 22 1.67	1.9263	2 46 0.3	11.119
14	22 47 48.70	2.1024	11 13 24.1	10.140	14	0 23 57.18	1.9239	2 34 53.1	11.120
15	22 49 54.70	2.0975	11 3 14.4	10.183	15	0 25 52.54	1.9215	2 23 45.9	11.120
16	22 52 0.40	2.0927	10 53 2.1	10.226	16	0 27 47.76	1.9193	2 12 38.7	11.119
17	22 54 5.82	2.0879	10 42 47.3	10.267	17	0 29 42.85	1.9171	2 1 31.6	11.118
18	22 56 10.95	2.0831	10 32 30.1	10.306	18	0 31 37.81	1.9149	1 50 24.6	11.116
19	22 58 15.79	2.0783	10 22 10.6	10.344	19	0 33 32.63	1.9127	1 39 17.7	11.113
20	23 0 20.35	2.0737	10 11 48.8	10.382	20	0 35 27.33	1.9107	1 28 11.1	11.109
21	23 2 24.63	2.0691	10 1 24.7	10.419	21	0 37 21.91	1.9087	1 17 4.7	11.105
22	23 4 28.64	2.0645	9 50 58.5	10.454	22	0 39 16.37	1.9067	1 5 58.5	11.100
23	23 6 32.37	2.0599	S. 9 40 30.2	10.488	23	0 41 10.71	1.9047	S. 0 54 52.7	11.094
THURSDAY 26.					SATURDAY 28.				
0	23 8 35.83	2.0554	S. 9 29 59.9	10.522	0	0 43 4.94	1.9029	S. 0 43 47.2	11.088
1	23 10 39.02	2.0510	9 19 27.6	10.554	1	0 44 59.06	1.9012	0 32 42.1	11.081
2	23 12 41.95	2.0467	9 8 53.4	10.586	2	0 46 53.08	1.8995	0 21 37.5	11.073
3	23 14 44.62	2.0423	8 58 17.3	10.617	3	0 48 47.00	1.8978	S. 0 10 33.3	11.066
4	23 16 47.03	2.0380	8 47 39.4	10.646	4	0 50 40.82	1.8960	N. 0 0 30.4	11.057
5	23 18 49.18	2.0337	8 36 59.8	10.674	5	0 52 34.54	1.8946	0 11 33.5	11.047
6	23 20 51.07	2.0295	8 26 18.5	10.702	6	0 54 28.17	1.8932	0 22 36.0	11.037
7	23 22 52.72	2.0254	8 15 35.6	10.728	7	0 56 21.72	1.8918	0 33 37.9	11.027
8	23 24 54.12	2.0213	8 4 51.1	10.754	8	0 58 15.19	1.8904	0 44 39.2	11.016
9	23 26 55.27	2.0172	7 54 5.1	10.778	9	1 0 8.57	1.8891	0 55 39.8	11.003
10	23 28 56.18	2.0132	7 43 17.7	10.802	10	1 2 1.88	1.8878	1 6 39.6	10.990
11	23 30 56.86	2.0093	7 32 28.8	10.826	11	1 3 55.11	1.8866	1 17 38.6	10.977
12	23 32 57.30	2.0054	7 21 38.6	10.847	12	1 5 48.27	1.8855	1 28 36.8	10.963
13	23 34 57.51	2.0016	7 10 47.2	10.868	13	1 7 41.37	1.8845	1 39 34.1	10.948
14	23 36 57.49	1.9978	6 59 54.5	10.888	14	1 9 34.41	1.8835	1 50 30.5	10.933
15	23 38 57.24	1.9940	6 49 0.6	10.907	15	1 11 27.39	1.8825	2 1 26.1	10.918
16	23 40 56.77	1.9904	6 38 5.6	10.926	16	1 13 20.31	1.8815	2 12 20.7	10.902
17	23 42 56.09	1.9868	6 27 9.5	10.943	17	1 15 13.17	1.8806	2 23 14.3	10.884
18	23 44 55.19	1.9832	6 16 12.4	10.960	18	1 17 5.98	1.8798	2 34 6.8	10.867
19	23 46 54.08	1.9797	6 5 14.3	10.976	19	1 18 58.75	1.8791	2 44 58.3	10.849
20	23 48 52.76	1.9762	5 54 15.3	10.990	20	1 20 51.48	1.8785	2 55 48.7	10.830
21	23 50 51.23	1.9729	5 43 15.5	11.003	21	1 22 44.17	1.8779	3 6 37.9	10.811
22	23 52 49.50	1.9696	5 32 14.9	11.017	22	1 24 36.83	1.8774	3 17 26.0	10.791
23	23 54 47.58	1.9663	5 21 13.5	11.030	23	1 26 29.46	1.8768	3 28 12.8	10.770
24	23 56 45.46	1.9631	S. 5 10 11.3	11.042	24	1 28 22.05	1.8763	N. 3 38 58.4	10.749

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
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SUNDAY 29.

0	1 <sup>h</sup> 28 <sup>m</sup> 22.05 <sup>s</sup>	1.8763	N. 3° 38' 58.4"	10.749
1	1 30 14.62	1.8760	3 49 42.7	10.798
2	1 32 7.17	1.8757	4 0 25.7	10.706
3	1 33 59.70	1.8754	4 11 7.4	10.683
4	1 35 52.22	1.8751	4 21 47.7	10.660
5	1 37 44.72	1.8749	4 32 26.6	10.636
6	1 39 37.21	1.8748	4 43 4.0	10.611
7	1 41 29.70	1.8748	4 53 39.9	10.586
8	1 43 22.19	1.8748	5 4 14.3	10.561
9	1 45 14.67	1.8748	5 14 47.2	10.535
10	1 47 7.16	1.8749	5 25 18.5	10.508
11	1 48 59.66	1.8751	5 35 48.2	10.481
12	1 50 52.18	1.8754	5 46 16.2	10.453
13	1 52 44.71	1.8757	5 56 42.5	10.424
14	1 54 37.26	1.8760	6 7 7.1	10.396
15	1 56 29.83	1.8763	6 17 30.0	10.367
16	1 58 22.42	1.8767	6 27 51.1	10.336
17	2 0 15.03	1.8771	6 38 10.3	10.305
18	2 2 7.67	1.8777	6 48 27.7	10.274
19	2 4 0.35	1.8783	6 58 43.2	10.243
20	2 5 53.07	1.8790	7 8 56.8	10.211
21	2 7 45.83	1.8797	7 19 8.5	10.178
22	2 9 38.63	1.8804	7 29 18.2	10.144
23	2 11 31.48	1.8812	N. 7° 39' 25.8"	10.110

MONDAY 30.

0	2 13 24.38	1.8891	N. 7° 49' 31.4"	10.076
1	2 15 17.33	1.8890	7 59 34.9	10.041
2	2 17 10.34	1.8889	8 9 36.3	10.006
3	2 19 3.40	1.8849	8 19 35.6	9.970
4	2 20 56.53	1.8860	8 29 32.7	9.933
5	2 22 49.72	1.8871	8 39 27.5	9.895
6	2 24 42.98	1.8882	8 49 20.1	9.857
7	2 26 36.31	1.8894	8 59 10.4	9.819
8	2 28 29.71	1.8907	9 8 58.4	9.781
9	2 30 23.19	1.8920	9 18 44.1	9.742
10	2 32 16.75	1.8933	9 28 27.4	9.703
11	2 34 10.39	1.8947	9 38 8.3	9.661
12	2 36 4.11	1.8961	9 47 46.7	9.620
13	2 37 57.92	1.8976	9 57 22.7	9.578
14	2 39 51.83	1.8992	10 6 56.1	9.536
15	2 41 45.83	1.9008	10 16 27.0	9.493
16	2 43 39.92	1.9024	10 25 55.3	9.450
17	2 45 34.11	1.9041	10 35 21.0	9.407
18	2 47 28.41	1.9058	10 44 44.1	9.363
19	2 49 22.81	1.9076	10 54 4.5	9.317
20	2 51 17.32	1.9094	11 3 22.2	9.273
21	2 53 11.94	1.9113	11 12 37.1	9.225
22	2 55 6.67	1.9132	11 21 49.2	9.178
23	2 57 1.52	1.9151	11 30 58.5	9.131
24	2 58 56.48	1.9170	N. 11° 40' 5.0"	9.084

TUESDAY 31.

0	2 <sup>h</sup> 58 <sup>m</sup> 56.48 <sup>s</sup>	1.9170	N. 11° 40' 5.0"	9.084
1	3 0 51.56	1.9191	11 49 8.6	9.036
2	3 2 46.77	1.9212	11 58 9.3	8.987
3	3 4 42.10	1.9233	12 7 7.0	8.937
4	3 6 37.56	1.9254	12 16 1.7	8.887
5	3 8 33.15	1.9276	12 24 53.4	8.837
6	3 10 28.88	1.9299	12 33 42.1	8.786
7	3 12 24.74	1.9322	12 42 27.7	8.734
8	3 14 20.74	1.9345	12 51 10.1	8.681
9	3 16 16.88	1.9368	12 59 49.4	8.628
10	3 18 13.16	1.9392	13 8 25.5	8.575
11	3 20 9.59	1.9417	13 16 58.4	8.521
12	3 22 6.16	1.9441	13 25 28.0	8.466
13	3 24 2.88	1.9466	13 33 54.3	8.411
14	3 25 59.76	1.9492	13 42 17.3	8.355
15	3 27 56.79	1.9517	13 50 36.9	8.298
16	3 29 53.97	1.9543	13 58 53.1	8.241
17	3 31 51.31	1.9570	14 7 5.8	8.183
18	3 33 48.81	1.9597	14 15 15.1	8.126
19	3 35 46.47	1.9624	14 23 20.9	8.067
20	3 37 44.30	1.9652	14 31 23.1	8.007
21	3 39 42.29	1.9679	14 39 21.7	7.947
22	3 41 40.45	1.9707	14 47 16.7	7.886
23	3 43 38.78	1.9735	N. 14° 55' 8.0"	7.824

WEDNESDAY, AUGUST 1.

0	3 45 37.27	1.9764	N. 15° 2' 55.6"	7.763
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PHASES OF THE MOON.

● New Moon.	July	d	h	m
☾ First Quarter.		16	0	12.8
○ Full Moon.		22	17	45.1
☾ Last Quarter.		30	8	29.6
☾ Apogee.	July	3	12.1	
☾ Perigee.		19	5.0	
☾ Apogee.		31	6.0	

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	$\alpha$ Aquilæ	W.	78 17 21	3623	79 35 30	3625	80 53 37	3628	82 11 41	3630
	Fomalhaut	W.	43 17 59	3508	44 38 14	3490	45 58 49	3473	47 19 43	3459
	$\alpha$ Pegasi	W.	32 32 8	4665	33 33 37	4546	34 36 49	4439	35 41 35	4345
	Aldebaran	E.	54 12 40	3013	52 42 43	3020	51 12 55	3027	49 43 16	3034
	SUN	E.	86 14 53	3371	84 52 3	3379	83 29 23	3387	82 6 52	3394
2	$\alpha$ Aquilæ	W.	88 41 20	3646	89 59 5	3649	91 16 46	3653	92 34 23	3658
	Fomalhaut	W.	54 7 44	3405	55 29 55	3397	56 52 15	3389	58 14 44	3382
	$\alpha$ Pegasi	W.	41 24 12	4008	42 35 44	3959	43 48 4	3916	45 1 8	3875
	Aldebaran	E.	42 16 55	3060	40 47 57	3065	39 19 4	3069	37 50 16	3072
	SUN	E.	75 16 7	3423	73 54 16	3427	72 32 30	3431	71 10 48	3433
3	Fomalhaut	W.	65 9 5	3351	66 32 18	3345	67 55 38	3338	69 19 5	3332
	$\alpha$ Pegasi	W.	51 15 41	3719	52 32 8	3694	53 49 1	3671	55 6 19	3649
	Aldebaran	E.	30 27 3	3081	28 58 30	3082	27 29 58	3082	26 1 26	3082
	SUN	E.	64 22 59	3442	63 1 30	3442	61 40 1	3443	60 18 33	3442
4	Fomalhaut	W.	76 17 56	3306	77 42 1	3300	79 6 13	3294	80 30 32	3288
	$\alpha$ Pegasi	W.	61 38 11	3558	62 57 31	3543	64 17 8	3527	65 37 2	3513
	SUN	E.	53 30 50	3432	52 9 10	3430	50 47 27	3425	49 25 39	3422
5	Fomalhaut	W.	87 33 44	3259	88 58 43	3254	90 23 48	3248	91 49 0	3242
	$\alpha$ Pegasi	W.	72 20 21	3448	73 41 43	3436	75 3 19	3425	76 25 7	3414
	$\alpha$ Arietis	W.	20 4 42	3746	30 20 40	3680	31 37 48	3621	32 56 0	3562
	SUN	E.	42 35 27	3397	41 13 7	3391	39 50 40	3385	38 28 6	3379
6	Fomalhaut	W.	98 56 41	3215	100 22 32	3209	101 48 30	3204	103 14 34	3199
	$\alpha$ Pegasi	W.	83 17 12	3363	84 40 11	3353	86 3 21	3345	87 26 41	3335
	$\alpha$ Arietis	W.	39 39 42	3372	41 2 31	3340	42 25 56	3313	43 49 53	3287
	SUN	E.	31 33 20	3343	30 9 58	3334	28 46 26	3326	27 22 45	3319
10	SUN	W.	14 33 7	3040	16 2 30	3028	17 32 8	3016	19 2 1	3005
	Spica	E.	79 10 3	2731	77 34 4	2722	75 57 54	2713	74 21 32	2705
	MARS	E.	81 20 26	2873	79 47 33	2864	78 14 28	2855	76 41 12	2846
	JUPITER	E.	113 37 22	2693	112 0 33	2684	110 23 31	2675	108 46 17	2665
11	SUN	W.	26 34 48	2953	28 6 0	2943	29 37 24	2933	31 9 1	2923
	Spica	E.	66 16 55	2664	64 39 27	2657	63 1 49	2650	61 24 2	2643
	MARS	E.	68 52 2	2804	67 17 39	2796	65 43 6	2788	64 8 22	2779
	JUPITER	E.	100 37 2	2621	98 58 35	2612	97 19 56	2603	95 41 5	2594
	Antares	E.	112 10 5	2681	110 32 59	2670	108 55 39	2660	107 18 6	2651
12	SUN	W.	38 50 9	2876	40 22 58	2867	41 55 59	2858	43 29 12	2849
	Spica	E.	53 12 42	2609	51 33 59	2604	49 55 9	2599	48 16 12	2593
	MARS	E.	56 12 10	2743	54 36 27	2736	53 0 35	2729	51 24 34	2723
	JUPITER	E.	87 23 55	2553	85 43 55	2544	84 3 43	2536	82 23 20	2529
	Antares	E.	99 7 10	2604	97 28 21	2596	95 49 21	2588	94 10 9	2579
13	SUN	W.	51 18 8	2905	52 52 29	2796	54 27 2	2788	56 1 46	2779
	Regulus	W.	14 42 12	2526	16 22 49	2510	18 3 48	2497	19 45 5	2485
	Spica	E.	39 59 58	2577	38 20 31	2576	36 41 3	2576	35 1 35	2577
	MARS	E.	43 22 30	2695	41 45 44	2692	40 8 53	2688	38 31 57	2684

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	$\alpha$ Aquilæ	W.	83° 29' 43"	3633	84° 47' 42"	3635	86° 5' 38"	3638	87° 23' 31"	3642
	Fomalhaut	W.	48 40 53	3446	50 2 17	3435	51 23 54	3424	52 45 43	3414
	$\alpha$ Pegasi	W.	36 47 46	4262	37 55 14	4187	39 3 52	4121	40 13 33	4062
	Aldebaran	E.	48 13 45	3040	46 44 22	3047	45 15 7	3052	43 45 58	3056
	Sun	E.	60 44 29	3400	79 22 13	3408	78 0 5	3413	76 38 3	3418
2	$\alpha$ Aquilæ	W.	93 51 55	3663	95 9 22	3667	96 26 44	3673	97 44 0	3677
	Fomalhaut	W.	59 37 21	3375	61 0 6	3368	62 22 59	3362	63 45 59	3357
	$\alpha$ Pegasi	W.	46 14 53	3838	47 29 16	3805	48 44 13	3774	49 59 42	3746
	Aldebaran	E.	36 21 32	3074	34 52 51	3077	33 24 13	3078	31 55 37	3080
	Sun	E.	69 49 9	3436	68 27 33	3438	67 6 0	3440	65 44 29	3441
3	Fomalhaut	W.	70 42 39	3327	72 6 19	3322	73 30 5	3317	74 53 57	3311
	$\alpha$ Pegasi	W.	56 24 0	3629	57 42 3	3610	59 0 26	3592	60 19 9	3575
	Aldebaran	E.	24 32 55	3082	23 4 23	3062	21 35 51	3081	20 7 18	3080
	Sun	E.	58 57 4	3440	57 35 33	3439	56 14 1	3438	54 52 27	3435
4	Fomalhaut	W.	81 54 57	3262	83 19 29	3277	84 44 7	3271	86 8 52	3265
	$\alpha$ Pegasi	W.	66 57 12	3499	68 17 37	3486	69 38 17	3472	70 59 12	3460
	Sun	E.	48 3 47	3417	46 41 50	3413	45 19 48	3408	43 57 40	3403
5	Fomalhaut	W.	93 14 19	3236	94 39 45	3231	96 5 17	3225	97 30 56	3220
	$\alpha$ Pegasi	W.	77 47 8	3403	79 9 21	3393	80 31 46	3382	81 54 23	3372
	$\alpha$ Arietis	W.	34 15 9	3521	35 35 10	3479	36 55 58	3439	38 17 30	3404
	Sun	E.	37 5 25	3372	35 42 36	3365	34 19 39	3358	32 56 34	3350
6	Fomalhaut	W.	104 40 44	3195	106 6 59	3190	107 33 20	3186	108 59 46	3183
	$\alpha$ Pegasi	W.	88 50 12	3326	90 13 53	3319	91 37 43	3312	93 1 41	3305
	$\alpha$ Arietis	W.	45 14 20	3262	46 39 16	3238	48 4 40	3216	49 30 30	3195
	Sun	E.	25 58 55	3310	24 34 55	3302	23 10 46	3294	21 46 27	3285
10	Sun	W.	20 32 8	2994	22 2 28	2983	23 33 2	2973	25 3 49	2963
	Spica	E.	72 44 59	2697	71 8 15	2688	69 31 19	2680	67 54 12	2672
	MARS	E.	75 7 44	2838	73 34 5	2829	72 0 15	2821	70 26 14	2812
	JUPITER	E.	107 8 50	2656	105 31 11	2647	103 53 20	2638	102 15 17	2629
11	Sun	W.	32 40 51	2913	34 12 53	2904	35 45 7	2895	37 17 32	2886
	Spica	E.	59 46 5	2636	58 7 59	2629	56 29 43	2621	54 51 17	2615
	MARS	E.	62 33 27	2772	60 58 22	2765	59 23 8	2757	57 47 44	2750
	JUPITER	E.	94 2 2	2585	92 22 47	2577	90 43 21	2569	89 3 44	2561
	Antares	E.	105 40 20	2642	104 2 22	2632	102 24 11	2623	100 45 47	2613
12	Sun	W.	45 2 36	2840	46 36 12	2831	48 9 59	2822	49 43 58	2814
	Spica	E.	46 37 8	2569	44 57 58	2565	43 18 42	2562	41 39 22	2559
	MARS	E.	49 48 25	2717	48 12 8	2711	46 35 43	2705	44 59 10	2700
	JUPITER	E.	80 42 47	2520	79 2 2	2512	77 21 6	2504	75 39 59	2497
	Antares	E.	92 30 45	2571	90 51 10	2562	89 11 23	2554	87 31 25	2547
13	Sun	W.	57 36 41	2771	59 11 47	2763	60 47 4	2754	62 22 32	2745
	Regulus	W.	21 26 39	2475	23 8 28	2465	24 50 31	2455	26 32 48	2445
	Spica	E.	33 22 8	2580	31 42 45	2585	30 3 29	2592	28 24 23	2609
	MARS	E.	36 54 56	2682	35 17 52	2681	33 40 46	2681	32 3 40	2681



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
13	JUPITER	E.	73° 56' 41"	9489	72° 17' 13"	9489	70° 35' 34"	9474	68° 53' 44"	9467
	Antares	E.	85 51 17	9539	84 10 58	9531	82 30 28	9594	80 49 48	9516
14	SUN	W.	63 58 12	9737	65 34 3	9799	67 10 4	9721	68 46 16	9713
	Regulus	W.	28 15 18	9437	29 58 0	9498	31 40 55	9419	33 24 3	9410
	MARS	E.	30 26 35	9694	28 49 33	9688	27 12 37	9695	25 35 50	9704
	JUPITER	E.	60 22 0	9430	58 39 8	9494	56 56 7	9417	55 12 56	9410
	Antares	E.	72 23 55	9481	70 42 15	9475	69 0 26	9469	67 18 20	9463
15	SUN	W.	76 49 58	9672	78 27 15	9665	80 4 42	9657	81 42 19	9649
	Regulus	W.	42 2 36	9371	43 46 52	9364	45 31 19	9356	47 15 57	9348
	JUPITER	E.	46 34 38	9378	44 50 31	9372	43 6 16	9366	41 21 53	9361
	Antares	E.	58 46 43	9436	57 3 59	9431	55 21 9	9428	53 38 14	9424
16	SUN	W.	89 53 0	9612	91 31 38	9606	93 10 25	9599	94 49 22	9591
	Regulus	W.	56 1 46	9313	57 47 27	9307	59 33 17	9300	61 19 17	9294
	JUPITER	E.	32 38 11	9340	30 53 10	9338	29 8 6	9336	27 22 59	9335
	Antares	E.	45 2 36	9415	43 19 22	9415	41 36 9	9417	39 52 58	9419
17	SUN	W.	103 6 26	9559	104 46 17	9553	106 26 16	9548	108 6 23	9543
	Regulus	W.	70 11 35	9263	71 58 29	9258	73 45 31	9259	75 32 41	9247
	α Aquilæ	E.	80 17 12	9271	78 44 16	9273	77 11 23	9276	75 38 34	9269
18	SUN	W.	116 28 44	9519	118 9 31	9515	119 50 24	9511	121 31 22	9507
	Regulus	W.	84 30 21	9225	86 18 12	9220	88 6 9	9217	89 54 11	9214
	Spica	W.	31 15 53	9348	33 0 42	9333	34 45 53	9330	36 31 24	9308
	MARS	W.	25 16 16	9509	26 57 17	9489	28 38 45	9474	30 20 35	9460
	α Aquilæ	E.	67 56 51	9333	66 25 14	9349	64 53 57	9367	63 23 3	9369
	Fomalhaut	E.	100 36 14	9454	98 53 56	9448	97 11 29	9449	95 28 54	9438
19	Regulus	W.	98 55 21	9304	100 43 43	9309	102 32 7	9301	104 20 33	9300
	Spica	W.	45 22 35	9268	47 9 21	9263	48 56 15	9259	50 43 15	9255
	MARS	W.	38 53 48	9415	40 37 1	9410	42 20 21	9405	44 3 48	9408
	α Aquilæ	E.	55 56 22	9149	54 29 3	9184	53 2 35	9239	51 37 4	9265
	Fomalhaut	E.	86 54 46	9496	85 11 49	9496	83 28 52	9427	81 45 56	9429
20	Spica	W.	59 39 12	9248	61 26 28	9249	63 13 43	9249	65 0 57	9251
	MARS	W.	52 41 59	9394	54 25 42	9395	56 9 24	9396	57 53 4	9398
	JUPITER	W.	25 18 44	9258	27 5 54	9248	28 53 10	9245	30 40 30	9245
	Fomalhaut	E.	73 12 17	9451	71 29 55	9458	69 47 43	9456	68 5 42	9475
	α Pegasi	E.	89 6 2	9578	87 26 37	9581	85 47 16	9585	84 8 1	9591
21	Spica	W.	73 56 12	9268	75 42 59	9272	77 29 39	9278	79 16 11	9285
	MARS	W.	66 30 28	9417	68 13 39	9422	69 56 43	9426	71 39 40	9433
	JUPITER	W.	39 37 4	9253	41 24 13	9257	43 11 16	9268	44 58 12	9266
	Antares	W.	28 41 20	9445	30 23 50	9430	32 6 42	9417	33 49 52	9408
	Fomalhaut	E.	59 39 35	9543	57 59 22	9561	56 19 34	9581	54 40 13	9603
	α Pegasi	E.	75 54 10	9636	74 16 4	9649	72 38 15	9669	71 0 45	9678
22	Spica	W.	88 6 20	9322	89 51 48	9331	91 37 2	9341	93 22 2	9350
	MARS	W.	80 11 54	9479	81 53 46	9482	83 35 25	9492	85 16 50	9502
	JUPITER	W.	53 50 41	9309	55 36 38	9310	57 22 23	9319	59 7 55	9326

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Dist.	XV <sup>h</sup> .	P. L. of Dist.	XVIII <sup>h</sup> .	P. L. of Dist.	XXI <sup>h</sup> .	P. L. of Dist.
13	JUPITER	E.	67° 11' 44"	9480	65° 29' 34"	9453	63° 47' 13"	9445	62° 4' 42"	9437
	Antares	E.	79 8 57	9509	77 27 56	9509	75 46 45	9495	74 5 25	9488
14	SUN	W.	70 22 39	9704	71 59 13	9697	73 35 57	9689	75 12 52	9681
	Regulus	W.	35 7 23	9403	36 50 54	9394	38 34 37	9387	40 18 31	9379
	MARS	E.	23 59 15	9717	22 22 58	9736	20 47 6	9763	19 11 48	9796
	JUPITER	E.	53 29 35	9403	51 46 5	9396	50 2 25	9390	48 18 36	9384
	Antares	E.	65 36 24	9457	63 54 10	9451	62 11 48	9446	60 29 19	9441
15	SUN	W.	83 20 7	9849	84 58 5	9835	86 36 13	9826	88 14 32	9820
	Regulus	W.	49 0 46	9349	50 45 45	9334	52 30 55	9327	54 16 15	9320
	JUPITER	E.	39 37 22	9356	37 52 44	9351	36 7 59	9347	34 23 8	9343
	Antares	E.	51 55 14	9491	50 12 9	9418	48 29 0	9417	46 45 49	9415
16	SUN	W.	96 28 29	9585	98 7 45	9578	99 47 10	9579	101 26 44	9586
	Regulus	W.	63 5 26	9387	64 51 45	9381	66 38 13	9374	68 24 50	9369
	JUPITER	E.	25 37 51	9337	23 52 45	9340	22 7 43	9345	20 22 49	9355
	Antares	E.	38 9 51	9494	36 26 51	9431	34 44 0	9438	33 1 20	9449
17	SUN	W.	109 46 37	9637	111 26 59	9639	113 7 28	9637	114 48 3	9633
	Regulus	W.	77 19 59	9349	79 7 24	9337	80 54 57	9333	82 42 36	9329
	α Aquilæ	E.	74 5 52	9699	72 33 19	9697	71 0 56	9697	69 28 46	9619
18	SUN	W.	123 12 25	9504	124 53 32	9509	126 34 43	9499	128 15 58	9497
	Regulus	W.	91 42 17	9311	93 30 28	9308	95 18 43	9306	97 7 1	9305
	Spica	W.	38 17 12	9398	40 3 15	9369	41 49 31	9361	43 35 58	9374
	MARS	W.	32 2 44	9448	33 45 10	9438	35 27 51	9439	37 10 44	9439
	α Aquilæ	E.	61 52 36	3013	60 22 39	3039	58 53 15	3069	57 24 28	3103
	Fomalhaut	E.	93 46 13	9434	92 3 27	9431	90 20 36	9439	88 37 42	9497
19	Regulus	W.	106 9 0	9300	107 57 27	9301	109 45 53	9303	111 34 17	9304
	Spica	W.	52 30 21	9253	54 17 30	9251	56 4 42	9246	57 51 56	9248
	MARS	W.	45 47 20	9399	47 30 56	9397	49 14 35	9396	50 58 16	9394
	α Aquilæ	E.	50 12 35	3345	48 49 15	3410	47 27 10	3484	46 6 28	3568
	Fomalhaut	E.	80 3 2	9431	78 20 12	9435	76 37 27	9439	74 54 48	9445
20	Spica	W.	66 48 8	9253	68 35 16	9256	70 22 20	9260	72 9 19	9264
	MARS	W.	59 36 41	9401	61 20 15	9403	63 3 45	9407	64 47 10	9419
	JUPITER	W.	32 27 51	9345	34 15 12	9345	36 2 32	9347	37 49 50	9349
	Fomalhaut	E.	66 23 54	9487	64 42 22	9499	63 1 7	9519	61 20 11	9537
	α Pegasi	E.	82 28 54	9508	80 49 56	9505	79 11 8	9514	77 32 32	9524
21	Spica	W.	81 2 33	9391	82 48 46	9398	84 34 49	9396	86 20 40	9313
	MARS	W.	73 22 28	9440	75 5 6	9448	76 47 33	9455	78 29 49	9463
	JUPITER	W.	46 45 1	9379	48 31 41	9379	50 18 12	9386	52 4 32	9394
	Antares	W.	35 33 15	9409	37 16 47	9397	39 0 26	9395	40 44 8	9395
	Fomalhaut	E.	53 1 22	9397	51 23 4	9353	49 45 21	9392	48 8 17	9714
	α Pegasi	E.	69 23 35	9395	67 46 48	9714	66 10 27	9735	64 34 33	9756
22	Spica	W.	95 6 48	9361	96 51 19	9372	98 35 34	9383	100 19 33	9395
	MARS	W.	86 58 0	9513	88 38 55	9524	90 19 35	9535	91 59 59	9547
	JUPITER	W.	60 53 13	9338	62 38 17	9348	64 23 6	9359	66 7 39	9371

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
22	Antares	W.	42° 27' 50"	2396	44° 11' 30"	2398	45° 55' 7"	2401	47° 38' 40"	2405
	Fomalhaut	E.	46 31 56	2749	44 56 21	2788	43 21 37	2831	41 47 49	2878
	α Pegasi	E.	62 59 8	2781	61 24 15	2806	59 49 55	2835	58 16 12	2885
23	Spica	W.	102 3 15	2408	103 46 39	2420	105 29 45	2433	107 12 33	2445
	MARS	W.	93 40 7	2560	95 19 57	2573	96 59 29	2586	98 38 43	2600
	JUPITER	W.	67 51 55	2382	69 35 55	2394	71 19 38	2406	73 3 4	2419
	Antares	W.	56 14 19	2442	57 56 54	2452	59 39 15	2463	61 21 22	2473
	α Pegasi	E.	50 38 26	2059	49 9 26	2109	47 41 27	2163	46 14 33	2221
	α Arietis	E.	91 46 43	2525	90 6 5	2538	88 25 44	2550	86 45 40	2564
24	JUPITER	W.	81 35 36	2486	83 17 9	2500	84 58 22	2515	86 39 14	2530
	Antares	W.	69 48 3	2532	71 28 32	2545	73 8 43	2558	74 48 36	2572
	α Arietis	E.	78 30 10	2638	76 52 6	2654	75 14 24	2671	73 37 5	2688
	Aldebaran	E.	109 53 24	2476	108 11 37	2490	106 30 10	2504	104 49 3	2519
25	JUPITER	W.	94 58 26	2605	96 37 14	2621	98 15 41	2635	99 53 48	2651
	Antares	W.	83 3 11	2643	84 41 7	2658	86 18 43	2673	87 55 59	2689
	α Aquilæ	W.	43 49 34	4031	45 0 43	3964	46 12 58	3906	47 26 12	3854
	α Arietis	E.	65 36 33	2783	64 1 43	2804	62 27 20	2825	60 53 24	2847
	Aldebaran	E.	96 28 35	2593	94 49 31	2609	93 10 48	2624	91 32 25	2639
26	Antares	W.	95 57 13	2765	97 32 27	2780	99 7 21	2795	100 41 55	2810
	α Aquilæ	W.	53 43 35	3679	55 0 44	3657	56 18 17	3637	57 36 11	3619
	α Arietis	E.	53 11 3	2965	51 40 7	2992	50 9 44	3019	48 39 55	3048
	Aldebaran	E.	83 25 40	2715	81 49 20	2729	80 13 19	2744	78 37 37	2759
	SUN	E.	129 13 42	3047	137 44 28	3064	136 15 34	3079	134 46 59	3095
27	α Aquilæ	W.	64 9 18	3571	65 28 24	3565	66 47 36	3563	68 6 51	3560
	α Arietis	E.	41 20 9	3213	39 54 15	3253	38 29 8	3295	37 4 51	3341
	Aldebaran	E.	70 43 55	2830	69 10 6	2843	67 36 34	2855	66 3 18	2868
	SUN	E.	127 28 50	3172	126 2 7	3186	124 35 41	3200	123 9 32	3214
28	α Aquilæ	W.	74 43 27	3562	76 2 43	3564	77 21 57	3567	78 41 7	3571
	Fomalhaut	W.	39 38 14	3509	40 58 28	3485	42 19 9	3464	43 40 13	3446
	α Pegasi	W.	29 55 15	5039	30 51 40	4863	31 50 25	4710	32 51 16	4578
	Aldebaran	E.	58 21 0	2928	56 49 17	2939	55 17 48	2950	53 46 33	2961
	SUN	E.	116 2 47	3279	114 38 11	3291	113 13 49	3302	111 49 40	3313
29	Fomalhaut	W.	50 29 46	3386	51 52 18	3379	53 14 58	3372	54 37 46	3366
	α Pegasi	W.	38 20 11	4125	39 29 49	4062	40 40 28	4007	41 52 1	3956
	Aldebaran	E.	46 13 20	3005	44 43 14	3014	43 13 18	3021	41 43 31	3028
	SUN	E.	104 51 58	3362	103 28 58	3371	102 6 8	3379	100 43 27	3386
30	Fomalhaut	W.	61 33 19	3344	62 56 40	3340	64 20 5	3336	65 43 35	3332
	α Pegasi	W.	48 0 44	3772	49 16 15	3745	50 32 15	3720	51 48 41	3696
	Aldebaran	E.	34 16 34	3056	32 47 31	3060	31 18 33	3064	29 49 39	3067
	SUN	E.	93 51 56	3415	92 29 56	3420	91 8 2	3423	89 46 12	3427
31	Fomalhaut	W.	72 42 2	3316	74 5 55	3313	75 29 52	3309	76 53 53	3305
	α Pegasi	W.	58 16 34	3600	59 35 8	3586	60 53 58	3570	62 13 5	3555
	SUN	E.	82 57 45	3435	81 36 8	3435	80 14 31	3436	78 52 55	3435

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	Antares	W.	49° 22' 7"	2412	51° 5' 25"	2418	52° 48' 34"	2426	54° 31' 32"	2434
	Fomalhaut	E.	40 15 2	2931	38 43 22	2989	37 12 56	3056	35 43 52	3129
	α Pegasi	E.	56 43 8	2898	55 10 46	2934	53 39 10	2972	52 8 22	3014
23	Spica	W.	108 55 2	2460	110 37 12	2474	112 19 2	2489	114 0 31	2504
	MARS	W.	100 17 38	2614	101 56 14	2628	103 34 31	2643	105 12 28	2658
	JUPITER	W.	74 46 12	2432	76 29 1	2445	78 11 31	2458	79 53 43	2472
	Antares	W.	63 3 14	2463	64 44 51	2494	66 26 12	2507	68 7 16	2519
	α Pegasi	E.	44 48 49	2925	43 24 20	3355	42 1 12	3431	40 39 31	3517
	α Arietis	E.	85 5 55	2577	83 26 29	2591	81 47 22	2606	80 8 35	2622
24	JUPITER	W.	88 19 45	2545	89 59 56	2559	91 39 47	2574	93 19 17	2590
	Antares	W.	76 28 10	2555	78 7 25	2600	79 46 20	2615	81 24 55	2629
	α Arietis	E.	72 0 9	2706	70 23 37	2725	68 47 30	2744	67 11 49	2763
	Aldebaran	E.	103 8 16	2534	101 27 50	2548	99 47 44	2564	98 7 59	2579
25	JUPITER	W.	101 31 34	2606	103 8 59	2622	104 46 3	2638	106 22 46	2713
	Antares	W.	89 32 54	2704	91 9 29	2719	92 45 44	2734	94 21 39	2750
	α Aquilæ	W.	48 40 19	2809	49 55 12	2770	51 10 45	2736	52 26 54	2706
	α Arietis	E.	59 19 57	2869	57 46 59	2892	56 14 30	2916	54 42 31	2940
	Aldebaran	E.	89 54 23	2655	88 16 42	2669	86 39 21	2684	85 2 20	2700
26	Antares	W.	102 16 10	2825	103 50 5	2841	105 23 40	2855	106 56 56	2869
	α Aquilæ	W.	58 54 22	2807	60 12 49	2595	61 31 29	2586	62 50 19	2577
	α Arietis	E.	47 10 42	2078	45 42 5	2109	44 14 6	2142	42 46 47	2176
	Aldebaran	E.	77 2 15	2773	75 27 12	2788	73 52 28	2801	72 18 2	2816
	SUN	E.	133 18 43	3111	131 50 47	3127	130 23 10	3142	128 55 51	3157
27	α Aquilæ	W.	69 26 9	2558	70 45 29	2558	72 4 49	2558	73 24 9	2560
	α Arietis	E.	35 41 27	2391	34 19 0	2445	32 57 34	2504	31 37 14	2570
	Aldebaran	E.	64 30 18	2881	62 57 35	2894	61 25 8	2906	59 52 57	2917
	SUN	E.	121 43 39	2928	120 18 3	2942	118 52 43	2954	117 27 38	2966
28	α Aquilæ	W.	80 0 13	2575	81 19 15	2579	82 38 12	2585	83 57 3	2590
	Fomalhaut	W.	45 1 37	2431	46 23 18	2418	47 45 14	2406	49 7 24	2395
	α Pegasi	W.	33 54 0	4463	34 58 25	4362	36 4 21	4273	37 11 39	4194
	Aldebaran	E.	52 15 31	2970	50 44 41	2980	49 14 3	2989	47 43 36	2997
	SUN	E.	110 25 44	3325	109 2 1	3334	107 38 29	3344	106 15 8	3353
29	Fomalhaut	W.	56 0 41	3360	57 23 43	3356	58 46 50	3351	60 10 2	3347
	α Pegasi	W.	43 4 24	3913	44 17 31	3872	45 31 19	3836	46 45 44	3802
	Aldebaran	E.	40 13 53	3034	38 44 23	3040	37 15 0	3046	35 45 44	3051
	SUN	E.	99 20 54	3393	97 58 29	3400	96 36 12	3405	95 14 1	3410
30	Fomalhaut	W.	67 7 9	3329	68 30 47	3326	69 54 28	3323	71 18 13	3319
	α Pegasi	W.	53 5 32	2675	54 22 46	2654	55 40 22	2635	56 58 18	2617
	Aldebaran	E.	28 20 49	3070	26 52 3	3073	25 23 20	3075	23 54 40	3077
	SUN	E.	88 24 26	3430	87 2 43	3431	85 41 2	3433	84 19 23	3434
31	Fomalhaut	W.	78 17 59	3301	79 42 9	3297	81 6 24	3293	82 30 44	3289
	α Pegasi	W.	63 32 28	3542	64 52 6	3528	66 11 59	3516	67 32 5	3504
	SUN	E.	77 31 18	3433	76 9 39	3431	74 47 57	3428	73 26 12	3425

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to		Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Subtracted from Apparent Time.				
Wed.	1	<sup>h</sup> 8 <sup>m</sup> 48 <sup>s</sup> 8.71	9.695	N. 17° 51' 33.5"	-38.26	15' 48.08"	66.59	<sup>m</sup> 6 <sup>s</sup> 2.06	0.161		
Thur.	2	8 52 1.06	9.670	17 36 6.5	38.98	15 48.21	66.50	5 57.87	0.146		
Frid.	3	8 55 52.83	9.646	17 20 22.3	39.69	15 48.34	66.41	5 53.10	0.210		
Sat.	4	8 59 44.01	9.621	17 4 21.1	-40.39	15 48.47	66.32	5 47.74	0.235		
SUN.	5	9 3 34.60	9.597	16 48 3.3	41.08	15 48.61	66.23	5 41.79	0.259		
Mon.	6	9 7 24.60	9.572	16 31 29.2	41.75	15 48.76	66.15	5 35.25	0.284		
Tues.	7	9 11 14.01	9.547	16 14 39.0	-42.42	15 48.91	66.06	5 28.12	0.308		
Wed.	8	9 15 2.84	9.522	15 57 33.1	43.07	15 49.06	65.98	5 20.41	0.333		
Thur.	9	9 18 51.08	9.498	15 40 11.9	43.71	15 49.22	65.89	5 12.12	0.357		
Frid.	10	9 22 38.74	9.474	15 22 35.6	-44.33	15 49.39	65.81	5 3.25	0.381		
Sat.	11	9 26 25.82	9.450	15 4 44.5	44.94	15 49.56	65.73	4 53.80	0.405		
SUN.	12	9 30 12.32	9.426	14 46 38.9	45.53	15 49.73	65.65	4 43.78	0.429		
Mon.	13	9 33 58.25	9.402	14 28 19.3	-46.11	15 49.91	65.57	4 33.19	0.453		
Tues.	14	9 37 43.62	9.379	14 9 45.9	46.68	15 50.09	65.49	4 22.04	0.476		
Wed.	15	9 41 28.44	9.356	13 50 59.0	47.23	15 50.27	65.41	4 10.33	0.499		
Thur.	16	9 45 12.72	9.334	13 31 59.0	-47.77	15 50.46	65.34	3 58.08	0.521		
Frid.	17	9 48 56.47	9.312	13 12 46.2	48.29	15 50.65	65.27	3 45.30	0.543		
Sat.	18	9 52 39.69	9.291	12 53 20.9	48.80	15 50.85	65.20	3 32.01	0.564		
SUN.	19	9 56 22.41	9.270	12 33 43.3	-49.31	15 51.05	65.13	3 18.22	0.585		
Mon.	20	10 0 4.64	9.250	12 13 53.9	49.80	15 51.25	65.06	3 3.94	0.605		
Tues.	21	10 3 46.40	9.231	11 53 52.9	50.28	15 51.45	64.99	2 49.19	0.624		
Wed.	22	10 7 27.70	9.212	11 33 40.6	-50.74	15 51.65	64.93	2 33.97	0.643		
Thur.	23	10 11 8.56	9.193	11 13 17.3	51.19	15 51.85	64.86	2 18.32	0.661		
Frid.	24	10 14 49.01	9.176	10 52 43.4	51.63	15 52.06	64.80	2 2.26	0.678		
Sat.	25	10 18 29.06	9.160	10 31 59.1	-52.06	15 52.27	64.74	1 45.79	0.694		
SUN.	26	10 22 8.71	9.144	10 11 4.7	52.47	15 52.48	64.68	1 28.93	0.710		
Mon.	27	10 25 48.00	9.129	9 50 0.6	52.87	15 52.69	64.62	1 11.71	0.725		
Tues.	28	10 29 26.94	9.115	9 28 47.0	-53.26	15 52.91	64.57	0 54.15	0.739		
Wed.	29	10 33 5.55	9.102	9 7 24.2	53.63	15 53.13	64.52	0 36.26	0.752		
Thur.	30	10 36 43.83	9.089	8 45 52.7	53.99	15 53.35	64.47	0 18.04	0.765		
Frid.	31	10 40 21.82	9.077	8 24 12.7	54.34	15 53.57	64.42	0 0.48	0.777		
Sat.	32	10 43 59.52	9.065	N. 8 2 24.4	-54.68	15 53.80	64.38	0 19.28	0.789		

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.18 from the sideral time.  
The sign — prefixed to the hourly change of declination indicates that north declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Subtracted from	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Added to Mean Time.		
Wed.	1	<sup>h</sup> 8 <sup>m</sup> 48 <sup>s</sup> 7.73	9.695	N. 17° 51' 37.4"	-38.26	<sup>m</sup> 6 <sup>s</sup> 2.07	0.161	<sup>h</sup> 8 <sup>m</sup> 42 <sup>s</sup> 5.66
Thur.	2	8 52 0.10	9.670	17 36 10.4	38.98	5 57.88	0.186	8 46 2.22
Frid.	3	8 55 51.88	9.646	17 20 26.2	39.69	5 53.11	0.210	8 49 58.77
Sat.	4	8 59 43.08	9.621	17 4 25.0	-40.39	5 47.75	0.235	8 53 55.33
SUN.	5	9 3 33.69	9.597	16 48 7.2	41.08	5 41.81	0.259	8 57 51.88
Mon.	6	9 7 23.71	9.572	16 31 33.1	41.75	5 35.27	0.284	9 1 48.44
Tues.	7	9 11 13.14	9.548	16 14 42.9	-42.42	5 28.15	0.308	9 5 44.99
Wed.	8	9 15 1.99	9.523	15 57 37.0	43.07	5 20.44	0.333	9 9 41.55
Thur.	9	9 18 50.26	9.499	15 40 15.7	43.71	5 12.15	0.357	9 13 38.10
Frid.	10	9 22 37.94	9.475	15 22 39.3	-44.33	5 3.28	0.381	9 17 34.66
Sat.	11	9 26 25.05	9.451	15 4 48.1	44.94	4 53.83	0.405	9 21 31.21
SUN.	12	9 30 11.58	9.427	14 46 42.5	45.53	4 43.81	0.429	9 25 27.77
Mon.	13	9 33 57.54	9.403	14 28 22.8	-46.11	4 33.22	0.453	9 29 24.32
Tues.	14	9 37 42.94	9.380	14 9 49.3	46.68	4 22.07	0.476	9 33 20.88
Wed.	15	9 41 27.79	9.357	13 51 2.3	47.23	4 10.36	0.499	9 37 17.43
Thur.	16	9 45 12.10	9.335	13 32 2.2	-47.77	3 58.11	0.521	9 41 13.99
Frid.	17	9 48 55.88	9.313	13 12 49.3	48.30	3 45.33	0.543	9 45 10.54
Sat.	18	9 52 39.14	9.292	12 53 23.8	48.81	3 32.04	0.564	9 49 7.10
SUN.	19	9 56 21.90	9.271	12 33 46.1	-49.32	3 18.25	0.585	9 53 3.65
Mon.	20	10 0 4.17	9.251	12 13 56.5	49.81	3 3.97	0.605	9 57 0.20
Tues.	21	10 3 45.97	9.232	11 53 55.3	50.29	2 49.22	0.624	10 0 56.75
Wed.	22	10 7 27.31	9.213	11 33 42.8	-50.75	2 34.00	0.643	10 4 53.31
Thur.	23	10 11 8.21	9.195	11 13 19.3	51.20	2 18.35	0.661	10 8 49.86
Frid.	24	10 14 48.70	9.178	10 52 45.2	51.64	2 2.28	0.678	10 12 46.42
Sat.	25	10 18 28.79	9.162	10 32 0.7	-52.07	1 45.81	0.694	10 16 42.97
SUN.	26	10 22 8.48	9.146	10 11 6.1	52.48	1 28.95	0.710	10 20 39.53
Mon.	27	10 25 47.81	9.131	9 50 1.7	52.88	1 11.73	0.725	10 24 36.08
Tues.	28	10 29 26.80	9.117	9 28 47.8	-53.27	0 54.17	0.739	10 28 32.63
Wed.	29	10 33 5.45	9.104	9 7 24.8	53.64	0 36.27	0.752	10 32 29.18
Thur.	30	10 36 43.78	9.091	8 45 53.0	54.00	0 18.04	0.765	10 36 25.74
Frid.	31	10 40 21.81	9.079	8 24 12.7	54.35	0 0.48	0.777	10 40 22.29
Sat.	32	10 43 59.56	9.067	N. 8 2 24.1	-54.69	0 19.28	0.789	10 44 18.84

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign — prefixed to the hourly change of declination indicates that north declinations are decreasing.

Diff. for 1 Hour,  
+ 9".5565.  
(Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	214	129° 35' 41".8	35° 26'.4	143.60	— 0.71	0.0063313	—23.5	15 15 23.96
2	215	130 33 8.8	32 53.3	143.65	0.63	0.0062738	24.4	15 11 28.05
3	216	131 30 36.9	30 21.3	143.70	0.52	0.0062142	25.3	15 7 32.14
4	217	132 28 6.2	27 50.4	143.75	— 0.39	0.0061525	—26.2	15 3 36.23
5	218	133 25 36.7	25 20.7	143.80	0.26	0.0060885	27.2	14 59 40.32
6	219	134 23 8.4	22 52.3	143.85	— 0.12	0.0060221	28.2	14 55 44.41
7	220	135 20 41.2	20 25.0	143.90	+ 0.01	0.0059533	—29.2	14 51 48.50
8	221	136 18 15.2	17 58.9	143.94	0.14	0.0058822	30.1	14 47 52.59
9	222	137 15 50.2	15 33.7	143.98	0.25	0.0058090	31.0	14 43 56.68
10	223	138 13 26.2	13 9.6	144.02	+ 0.34	0.0057335	—31.9	14 40 0.77
11	224	139 11 3.3	10 46.6	144.07	0.40	0.0056558	32.8	14 36 4.87
12	225	140 8 41.4	8 24.6	144.11	0.44	0.0055761	33.6	14 32 8.96
13	226	141 6 20.4	6 3.5	144.15	+ 0.44	0.0054944	—34.4	14 28 13.05
14	227	142 4 0.4	3 43.4	144.19	0.40	0.0054110	35.1	14 24 17.14
15	228	143 1 41.5	1 24.3	144.24	0.34	0.0053259	35.7	14 20 21.23
16	229	143 59 23.7	59 6.4	144.28	+ 0.27	0.0052394	—36.3	14 16 25.32
17	230	144 57 6.9	56 49.5	144.33	0.16	0.0051515	36.8	14 12 29.41
18	231	145 54 51.2	54 33.7	144.38	+ 0.03	0.0050625	37.3	14 8 33.50
19	232	146 52 36.7	52 19.0	144.43	— 0.10	0.0049724	—37.7	14 4 37.60
20	233	147 50 23.5	50 5.7	144.48	0.22	0.0048813	38.1	14 0 41.69
21	234	148 48 11.6	47 53.7	144.54	0.35	0.0047894	38.4	13 56 45.78
22	235	149 46 1.2	45 43.2	144.60	— 0.46	0.0046967	—38.8	13 52 49.87
23	236	150 43 52.3	43 34.2	144.66	0.56	0.0046032	39.1	13 48 53.97
24	237	151 41 45.0	41 26.8	144.73	0.63	0.0045089	39.5	13 44 58.06
25	238	152 39 39.3	39 21.0	144.80	— 0.67	0.0044138	—39.8	13 41 2.15
26	239	153 37 35.3	37 16.9	144.87	0.68	0.0043179	40.2	13 37 6.24
27	240	154 35 33.1	35 14.6	144.95	0.67	0.0042210	40.6	13 33 10.34
28	241	155 33 32.9	33 14.3	145.03	— 0.61	0.0041231	—41.1	13 29 14.43
29	242	156 31 34.6	31 15.9	145.11	0.54	0.0040240	41.6	13 25 18.52
30	243	157 29 38.2	29 19.4	145.19	0.43	0.0039237	42.1	13 21 22.61
31	244	158 27 43.7	27 24.8	145.27	0.32	0.0038221	42.6	13 17 26.71
32	245	159 25 51.2	25 32.2	145.35	— 0.18	0.0037192	—43.2	13 13 30.80
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>h</sup> .0.								
								Diff. for 1 Hour, — 9 <sup>s</sup> .8296. (Table II.)

GREENWICH MEAN TIME.

Day of the Month.	THE MOON'S								
	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	14 49.2	14 50.6	54 16.6	+0.32	54 21.6	+0.52	19 39.7	1.94	23.2
2	14 52.6	14 55.2	54 29.0	0.71	54 38.6	0.89	20 27.2	2.03	24.2
3	14 58.4	15 2.0	54 50.2	1.04	55 3.6	1.18	21 16.9	2.11	25.2
4	15 6.1	15 10.5	55 18.5	+1.30	55 34.7	+1.39	22 8.3	2.17	26.2
5	15 15.2	15 20.1	55 51.9	1.47	56 9.9	1.52	23 0.8	2.20	27.2
6	15 25.1	15 30.1	56 28.3	1.53	56 46.7	1.52	23 53.5	2.19	28.2
7	15 35.1	15 39.9	57 4.9	+1.49	57 22.5	+1.44	6		29.2
8	15 44.5	15 48.8	57 39.4	1.37	57 55.3	1.28	0 45.8	2.16	0.7
9	15 52.8	15 56.4	58 10.0	1.17	58 23.4	1.06	1 37.2	2.12	1.7
10	15 59.7	16 2.5	58 35.3	+0.93	58 45.7	+0.80	2 27.8	2.09	2.7
11	16 4.9	16 6.9	58 54.6	0.68	59 2.0	0.56	3 18.0	2.09	3.7
12	16 8.6	16 9.8	59 7.9	0.44	59 12.5	0.32	4 8.4	2.12	4.7
13	16 10.6	16 11.2	59 15.6	+0.21	59 17.5	+0.10	4 59.8	2.17	5.7
14	16 11.3	16 11.2	59 18.1	0.00	59 17.5	-0.10	5 52.8	2.26	6.7
15	16 10.6	16 9.8	59 15.6	-0.21	59 12.5	0.31	6 48.0	2.34	7.7
16	16 8.6	16 7.1	59 8.1	-0.42	59 2.4	-0.53	7 45.0	2.41	8.7
17	16 5.1	16 2.9	58 55.4	0.64	58 47.0	0.76	8 43.3	2.43	9.7
18	16 0.2	15 57.1	58 37.2	0.88	58 26.0	0.99	9 41.3	2.39	10.7
19	15 53.7	15 49.9	58 13.4	-1.11	57 59.5	-1.21	10 37.8	2.30	11.7
20	15 45.8	15 41.4	57 44.4	1.30	57 28.3	1.38	11 31.7	2.18	12.7
21	15 36.8	15 32.0	57 11.3	1.44	56 53.8	1.48	12 22.5	2.05	13.7
22	15 27.1	15 22.2	56 35.8	-1.50	56 17.7	-1.50	13 10.4	1.94	14.7
23	15 17.4	15 12.6	55 59.9	1.47	55 42.5	1.41	13 55.8	1.85	15.7
24	15 8.1	15 3.9	55 26.0	1.33	55 10.5	1.23	14 39.6	1.80	16.7
25	15 0.1	14 56.7	54 56.4	-1.11	54 44.0	-0.96	15 22.4	1.77	17.7
26	14 53.8	14 51.5	54 33.4	0.80	54 24.9	0.62	16 5.1	1.79	18.7
27	14 49.8	14 48.7	54 18.6	0.43	54 14.7	-0.22	16 48.4	1.83	19.7
28	14 48.3	14 48.6	54 13.3	-0.01	54 14.4	+0.20	17 33.0	1.89	20.7
29	14 49.6	14 51.4	54 18.1	+0.42	54 24.4	0.63	18 19.3	1.97	21.7
30	14 53.8	14 56.9	54 33.3	0.84	54 44.7	1.05	19 7.6	2.06	22.7
31	15 0.6	15 5.0	54 58.5	1.24	55 14.4	1.41	19 57.8	2.13	23.7
32	15 9.8	15 15.2	55 32.3	+1.56	55 51.9	+1.70	20 49.5	2.18	24.7



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 1.					FRIDAY 3.				
0	3 45 37.27	1.9764	N.15 2 55.6	7.769	0	5 24 11.24	2.1343	N.19 52 17.3	4.050
1	3 47 35.94	1.9793	16 10 39.5	7.700	1	5 26 19.40	2.1377	19 56 17.6	3.957
2	3 49 34.79	1.9822	15 18 19.6	7.637	2	5 28 27.76	2.1410	20 0 12.2	3.864
3	3 51 33.81	1.9852	15 25 55.9	7.573	3	5 30 36.32	2.1443	20 4 1.2	3.770
4	3 53 33.01	1.9882	15 33 28.4	7.509	4	5 32 45.08	2.1476	20 7 44.6	3.676
5	3 55 32.39	1.9912	15 40 57.0	7.444	5	5 34 54.03	2.1509	20 11 22.3	3.580
6	3 57 31.96	1.9943	15 48 21.7	7.379	6	5 37 3.18	2.1542	20 14 54.2	3.484
7	3 59 31.71	1.9973	15 55 42.5	7.312	7	5 39 12.53	2.1574	20 18 20.4	3.388
8	4 1 31.64	2.0004	16 2 59.2	7.245	8	5 41 22.07	2.1606	20 21 40.8	3.292
9	4 3 31.76	2.0036	16 10 11.9	7.177	9	5 43 31.80	2.1638	20 24 55.4	3.194
10	4 5 32.07	2.0067	16 17 20.5	7.109	10	5 45 41.73	2.1670	20 28 4.1	3.096
11	4 7 32.56	2.0098	16 24 25.0	7.041	11	5 47 51.84	2.1701	20 31 6.9	2.997
12	4 9 33.24	2.0129	16 31 25.4	6.972	12	5 50 2.14	2.1732	20 34 3.8	2.898
13	4 11 34.11	2.0161	16 38 21.6	6.904	13	5 52 12.63	2.1763	20 36 54.7	2.798
14	4 13 35.18	2.0194	16 45 13.6	6.831	14	5 54 23.30	2.1794	20 39 39.6	2.698
15	4 15 36.44	2.0226	16 52 1.3	6.759	15	5 56 34.16	2.1825	20 42 18.5	2.597
16	4 17 37.89	2.0259	16 58 44.7	6.688	16	5 58 45.20	2.1855	20 44 51.3	2.496
17	4 19 39.54	2.0292	17 5 23.8	6.616	17	6 0 56.42	2.1885	20 47 18.0	2.395
18	4 21 41.39	2.0325	17 11 58.6	6.543	18	6 3 7.82	2.1914	20 49 38.7	2.293
19	4 23 43.44	2.0357	17 18 28.9	6.468	19	6 5 19.39	2.1943	20 51 53.2	2.190
20	4 25 45.68	2.0390	17 24 54.8	6.394	20	6 7 31.14	2.1972	20 54 1.5	2.087
21	4 27 48.12	2.0423	17 31 16.2	6.318	21	6 9 43.06	2.2001	20 56 3.6	1.982
22	4 29 50.76	2.0457	17 37 33.0	6.242	22	6 11 55.15	2.2029	20 57 59.4	1.877
23	4 31 53.61	2.0491	N.17 43 45.3	6.166	23	6 14 7.41	2.2057	N.20 59 48.9	1.772
THURSDAY 2.					SATURDAY 4.				
0	4 33 56.66	2.0525	N.17 49 53.0	6.089	0	6 16 19.84	2.2085	N.21 1 32.1	1.667
1	4 35 59.91	2.0558	17 55 56.0	6.012	1	6 18 32.43	2.2112	21 3 9.0	1.562
2	4 38 3.36	2.0593	18 1 54.4	5.934	2	6 20 45.18	2.2138	21 4 39.5	1.456
3	4 40 7.02	2.0627	18 7 48.1	5.855	3	6 22 58.09	2.2165	21 6 3.7	1.349
4	4 42 10.88	2.0661	18 13 37.0	5.775	4	6 25 11.16	2.2192	21 7 21.4	1.242
5	4 44 14.95	2.0695	18 19 21.1	5.694	5	6 27 24.39	2.2217	21 8 32.7	1.135
6	4 46 19.22	2.0728	18 25 0.3	5.613	6	6 29 37.77	2.2242	21 9 37.6	1.027
7	4 48 23.69	2.0762	18 30 34.7	5.532	7	6 31 51.30	2.2267	21 10 36.0	0.918
8	4 50 28.37	2.0797	18 36 4.2	5.450	8	6 34 4.98	2.2292	21 11 27.8	0.809
9	4 52 33.26	2.0832	18 41 28.7	5.367	9	6 36 18.80	2.2315	21 12 13.1	0.700
10	4 54 38.35	2.0866	18 46 48.3	5.284	10	6 38 32.76	2.2338	21 12 51.8	0.590
11	4 56 43.65	2.0901	18 52 2.8	5.200	11	6 40 46.86	2.2361	21 13 23.9	0.481
12	4 58 49.16	2.0935	18 57 12.3	5.116	12	6 43 1.10	2.2384	21 13 49.5	0.371
13	5 0 54.87	2.0969	19 2 16.7	5.030	13	6 45 15.47	2.2406	21 14 8.4	0.260
14	5 3 0.79	2.1004	19 7 15.9	4.944	14	6 47 29.97	2.2427	21 14 20.7	0.149
15	5 5 6.92	2.1038	19 12 10.0	4.857	15	6 49 44.60	2.2449	21 14 26.3	+ 0.038
16	5 7 13.25	2.1072	19 16 58.8	4.770	16	6 51 59.36	2.2470	21 14 25.2	- 0.074
17	5 9 19.78	2.1106	19 21 42.4	4.682	17	6 54 14.24	2.2490	21 14 17.4	0.187
18	5 11 26.52	2.1141	19 26 20.7	4.594	18	6 56 29.24	2.2510	21 14 2.8	0.299
19	5 13 33.47	2.1175	19 30 53.7	4.505	19	6 58 44.36	2.2529	21 13 41.5	0.411
20	5 15 40.62	2.1208	19 35 21.3	4.415	20	7 0 59.59	2.2547	21 13 13.5	0.524
21	5 17 47.97	2.1242	19 39 43.5	4.324	21	7 3 14.93	2.2566	21 12 38.7	0.637
22	5 19 55.52	2.1276	19 44 0.2	4.233	22	7 5 30.38	2.2583	21 11 57.1	0.750
23	5 22 3.28	2.1310	19 48 11.5	4.142	23	7 7 45.93	2.2600	21 11 8.7	0.863
24	5 24 11.24	2.1343	N.19 52 17.3	4.050	24	7 10 1.58	2.2617	N.21 10 13.5	0.977

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 5.					TUESDAY 7.				
0	<sup>h</sup> 7 <sup>m</sup> 10 <sup>s</sup> 1.58	2.2617	N. 21° 10' 13.5"	0.977	0	<sup>h</sup> 8 <sup>m</sup> 59 <sup>s</sup> 28.88	2.2791	N. 18° 11' 42.1"	6.406
1	7 12 17.33	2.2633	21 9 11.5	1.091	1	9 1 45.60	2.2784	18 5 14.6	6.512
2	7 14 31.17	2.2649	21 8 2.6	1.205	2	9 4 2.28	2.2776	17 58 40.7	6.617
3	7 16 49.11	2.2664	21 6 46.9	1.319	3	9 6 18.91	2.2767	17 52 0.5	6.799
4	7 19 5.14	2.2678	21 5 24.3	1.434	4	9 8 35.49	2.2758	17 45 14.0	6.897
5	7 21 21.25	2.2692	21 3 54.8	1.548	5	9 10 52.01	2.2748	17 38 21.2	6.939
6	7 23 37.44	2.2705	21 2 18.5	1.662	6	9 13 8.47	2.2738	17 31 22.2	7.035
7	7 25 53.71	2.2717	21 0 35.3	1.777	7	9 15 24.87	2.2728	17 24 17.0	7.138
8	7 28 10.05	2.2730	20 58 45.2	1.892	8	9 17 41.21	2.2718	17 17 5.6	7.241
9	7 30 26.47	2.2742	20 56 48.2	2.007	9	9 19 57.49	2.2707	17 9 48.1	7.349
10	7 32 42.96	2.2753	20 54 44.3	2.122	10	9 22 13.70	2.2697	17 2 24.5	7.443
11	7 34 59.51	2.2764	20 52 33.5	2.237	11	9 24 29.85	2.2686	16 54 54.9	7.543
12	7 37 16.13	2.2775	20 50 15.8	2.352	12	9 26 45.93	2.2674	16 47 19.3	7.643
13	7 39 32.81	2.2784	20 47 51.2	2.467	13	9 29 1.94	2.2662	16 39 37.7	7.743
14	7 41 49.54	2.2792	20 45 19.7	2.582	14	9 31 17.88	2.2650	16 31 50.2	7.842
15	7 44 6.32	2.2801	20 42 41.3	2.696	15	9 33 33.74	2.2638	16 23 56.7	7.940
16	7 46 23.15	2.2809	20 39 55.9	2.814	16	9 35 49.53	2.2626	16 15 57.4	8.036
17	7 48 40.03	2.2817	20 37 3.6	2.929	17	9 38 5.25	2.2613	16 7 52.4	8.132
18	7 50 56.95	2.2824	20 34 4.4	3.044	18	9 40 20.89	2.2600	15 59 41.6	8.228
19	7 53 13.91	2.2830	20 30 58.3	3.159	19	9 42 36.45	2.2587	15 51 25.1	8.323
20	7 55 30.91	2.2836	20 27 45.3	3.274	20	9 44 51.93	2.2574	15 43 2.9	8.418
21	7 57 47.94	2.2841	20 24 25.4	3.389	21	9 47 7.34	2.2561	15 34 35.0	8.512
22	8 0 5.00	2.2845	20 20 58.6	3.504	22	9 49 22.67	2.2547	15 26 1.5	8.604
23	8 2 22.08	2.2849	N. 20 17 24.9	3.618	23	9 51 37.91	2.2533	N. 15 17 22.5	8.695
MONDAY 6.					WEDNESDAY 8.				
0	8 4 39.19	2.2853	N. 20 13 44.4	3.733	0	9 53 53.06	2.2519	N. 15 8 38.1	8.786
1	8 6 56.32	2.2856	20 9 57.0	3.848	1	9 56 8.13	2.2505	14 59 48.2	8.876
2	8 9 13.46	2.2859	20 6 2.7	3.963	2	9 58 23.12	2.2492	14 50 53.0	8.965
3	8 11 30.62	2.2861	20 2 1.5	4.077	3	10 0 38.03	2.2478	14 41 52.4	9.054
4	8 13 47.79	2.2862	19 57 53.5	4.190	4	10 2 52.85	2.2463	14 32 46.5	9.142
5	8 16 4.97	2.2863	19 53 38.7	4.303	5	10 5 7.59	2.2449	14 23 35.4	9.228
6	8 18 22.15	2.2863	19 49 17.1	4.417	6	10 7 22.24	2.2434	14 14 19.1	9.314
7	8 20 39.33	2.2863	19 44 48.7	4.530	7	10 9 36.80	2.2419	14 4 57.7	9.399
8	8 22 56.51	2.2863	19 40 13.5	4.643	8	10 11 51.27	2.2405	13 55 31.2	9.483
9	8 25 13.69	2.2862	19 35 31.5	4.756	9	10 14 5.66	2.2391	13 45 59.7	9.567
10	8 27 30.86	2.2861	19 30 42.7	4.869	10	10 16 19.96	2.2376	13 36 23.2	9.649
11	8 29 48.02	2.2859	19 25 47.2	4.981	11	10 18 34.17	2.2362	13 26 41.8	9.730
12	8 32 5.17	2.2857	19 20 45.0	5.092	12	10 20 48.30	2.2347	13 16 55.6	9.810
13	8 34 22.30	2.2854	19 15 36.1	5.204	13	10 23 2.34	2.2332	13 7 4.6	9.890
14	8 36 39.41	2.2850	19 10 20.5	5.316	14	10 25 16.29	2.2317	12 57 8.8	9.969
15	8 38 56.50	2.2846	19 4 58.2	5.427	15	10 27 30.15	2.2303	12 47 8.3	10.047
16	8 41 13.56	2.2842	18 59 29.3	5.537	16	10 29 43.93	2.2289	12 37 3.2	10.123
17	8 43 30.60	2.2838	18 53 53.8	5.647	17	10 31 57.62	2.2274	12 26 53.5	10.199
18	8 45 47.61	2.2833	18 48 11.7	5.757	18	10 34 11.22	2.2260	12 16 39.3	10.273
19	8 48 4.59	2.2827	18 42 23.0	5.866	19	10 36 24.74	2.2246	12 6 20.7	10.347
20	8 50 21.53	2.2820	18 36 27.8	5.974	20	10 38 38.17	2.2231	11 55 57.6	10.421
21	8 52 38.43	2.2813	18 30 26.1	6.083	21	10 40 51.51	2.2217	11 45 30.2	10.493
22	8 54 55.29	2.2806	18 24 17.9	6.191	22	10 43 4.77	2.2203	11 34 58.5	10.563
23	8 57 12.11	2.2799	18 18 3.2	6.298	23	10 45 17.95	2.2189	11 24 22.6	10.639
24	8 59 28.88	2.2791	N. 18 11 42.1	6.406	24	10 47 31.04	2.2175	N. 11 13 42.6	10.701

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 9.					SATURDAY 11.				
0	<sup>h</sup> 10 <sup>m</sup> 47 <sup>s</sup> 31.04	2.3175	N. 11° 13' 42.6"	10.701	0	<sup>h</sup> 12 <sup>m</sup> 32 <sup>s</sup> 49.56	2.1831	N. 1° 41' 30.7"	12.002
1	10 49 44.05	2.3162	11 2 58.5	10.769	1	12 35 0.55	2.1833	1 28 57.8	12.705
2	10 51 56.98	2.3148	10 52 10.3	10.836	2	12 37 11.56	2.1836	1 16 15.1	12.717
3	10 51 9.83	2.3135	10 41 18.2	10.901	3	12 39 22.58	2.1839	1 3 31.8	12.737
4	10 56 22.60	2.3122	10 30 22.2	10.966	4	12 41 33.63	2.1843	0 50 47.9	12.736
5	10 58 35.29	2.3109	10 19 22.3	11.029	5	12 43 44.70	2.1847	0 38 3.5	12.743
6	11 0 47.91	2.3096	10 8 18.7	11.091	6	12 45 55.79	2.1851	0 25 18.7	12.749
7	11 3 0.45	2.3083	9 57 11.4	11.153	7	12 48 6.91	2.1856	N. 0 12 33.6	12.755
8	11 5 12.91	2.3071	9 46 0.4	11.214	8	12 50 18.07	2.1862	S. 0 0 11.9	12.760
9	11 7 25.30	2.3059	9 34 45.7	11.274	9	12 52 29.26	2.1868	0 12 57.6	12.763
10	11 9 37.62	2.3046	9 23 27.5	11.332	10	12 54 40.49	2.1875	0 25 43.4	12.764
11	11 11 49.86	2.3034	9 12 5.9	11.388	11	12 56 51.76	2.1882	0 38 29.3	12.765
12	11 14 2.03	2.3023	9 0 41.0	11.444	12	12 59 3.07	2.1889	0 51 15.2	12.764
13	11 16 14.14	2.3012	8 49 12.7	11.499	13	13 1 14.43	2.1897	1 4 1.0	12.762
14	11 18 26.18	2.3001	8 37 41.1	11.552	14	13 3 25.84	2.1906	1 16 46.6	12.758
15	11 20 38.15	2.1990	8 26 6.4	11.604	15	13 5 37.30	2.1915	1 29 32.0	12.753
16	11 22 50.06	2.1980	8 14 28.6	11.656	16	13 7 48.82	2.1925	1 42 17.0	12.748
17	11 25 1.91	2.1970	8 2 47.7	11.707	17	13 10 0.40	2.1934	1 55 1.7	12.741
18	11 27 1.70	2.1960	7 51 3.7	11.757	18	13 12 12.03	2.1944	2 7 45.9	12.732
19	11 29 25.43	2.1950	7 39 16.8	11.805	19	13 14 23.73	2.1956	2 20 29.5	12.722
20	11 31 37.10	2.1941	7 27 27.1	11.852	20	13 16 35.50	2.1967	2 33 12.6	12.712
21	11 33 48.72	2.1932	7 15 34.6	11.897	21	13 18 47.34	2.1979	2 45 55.0	12.700
22	11 36 0.29	2.1924	7 3 39.4	11.942	22	13 20 59.25	2.1992	2 58 36.6	12.687
23	11 38 11.81	2.1915	N. 6 51 41.5	11.986	23	13 23 11.24	2.2004	S. 3 11 17.4	12.673
FRIDAY 10.					SUNDAY 12.				
0	11 40 23.27	2.1907	N. 6 39 41.1	12.028	0	13 25 23.30	2.2017	S. 3 23 57.3	12.657
1	11 42 34.69	2.1899	6 27 38.2	12.069	1	13 27 35.45	2.2031	3 36 36.2	12.639
2	11 44 46.06	2.1892	6 15 32.8	12.110	2	13 29 47.68	2.2046	3 49 14.0	12.621
3	11 46 57.39	2.1885	6 3 25.0	12.149	3	13 32 0.00	2.2061	4 1 50.7	12.602
4	11 49 8.68	2.1878	5 51 14.9	12.187	4	13 34 12.41	2.2077	4 14 26.2	12.581
5	11 51 19.93	2.1872	5 39 2.6	12.223	5	13 36 24.92	2.2092	4 27 0.4	12.559
6	11 53 31.15	2.1867	5 26 48.2	12.258	6	13 38 37.52	2.2108	4 39 33.3	12.536
7	11 55 42.33	2.1861	5 14 31.7	12.293	7	13 40 50.22	2.2125	4 52 4.7	12.511
8	11 57 53.48	2.1856	5 2 13.1	12.326	8	13 43 3.02	2.2142	5 4 34.6	12.486
9	12 0 4.60	2.1851	4 49 52.6	12.357	9	13 45 15.93	2.2160	5 17 3.0	12.459
10	12 2 15.69	2.1847	4 37 30.2	12.388	10	13 47 28.94	2.2178	5 29 29.7	12.430
11	12 4 26.76	2.1843	4 25 6.0	12.417	11	13 49 42.07	2.2197	5 41 54.6	12.400
12	12 6 37.81	2.1840	4 12 40.1	12.446	12	13 51 55.31	2.2217	5 54 17.7	12.370
13	12 8 48.84	2.1837	4 0 12.5	12.473	13	13 54 8.67	2.2237	6 6 39.0	12.338
14	12 10 59.85	2.1833	3 47 43.3	12.499	14	13 56 22.15	2.2256	6 18 58.3	12.304
15	12 13 10.84	2.1831	3 35 12.6	12.524	15	13 58 35.74	2.2276	6 31 15.5	12.269
16	12 15 21.82	2.1829	3 22 40.4	12.547	16	14 0 49.46	2.2297	6 43 30.6	12.234
17	12 17 32.79	2.1828	3 10 6.9	12.569	17	14 3 3.31	2.2319	6 55 43.6	12.197
18	12 19 43.76	2.1827	2 57 32.1	12.591	18	14 5 17.29	2.2341	7 7 54.3	12.158
19	12 21 54.72	2.1827	2 44 56.0	12.611	19	14 7 31.40	2.2363	7 20 2.6	12.119
20	12 24 5.68	2.1827	2 32 18.8	12.629	20	14 9 45.65	2.2386	7 32 8.6	12.079
21	12 26 16.64	2.1827	2 19 40.5	12.647	21	14 12 0.03	2.2409	7 44 12.1	12.037
22	12 28 27.61	2.1828	2 7 1.1	12.664	22	14 14 14.55	2.2433	7 56 13.0	11.993
23	12 30 38.58	2.1829	1 54 20.8	12.678	23	14 16 29.22	2.2457	8 8 11.3	11.948
24	12 32 49.56	2.1831	N. 1 41 39.7	12.692	24	14 18 44.03	2.2481	S. 8 20 6.8	11.902

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 13.					WEDNESDAY 15.				
0	<sup>h</sup> 14 <sup>m</sup> 18 <sup>s</sup> 44.03	2.9481	S. 8° 20' 6.8"	11.909	0	<sup>h</sup> 16 <sup>m</sup> 10 <sup>s</sup> 1.39	2.3953	S. 16° 35' 13.1"	8.967
1	14 20 58.99	2.9506	8 31 59.5	11.855	1	16 12 25.21	2.3986	16 43 26.0	8.162
2	14 23 14.10	2.9531	8 43 49.4	11.807	2	16 14 49.22	2.4018	16 51 32.6	8.057
3	14 25 29.36	2.9557	8 55 36.4	11.758	3	16 17 13.42	2.4049	16 59 32.9	7.952
4	14 27 44.78	2.9582	9 7 20.4	11.707	4	16 19 37.81	2.4081	17 7 26.8	7.845
5	14 30 0.35	2.9608	9 19 1.3	11.655	5	16 22 2.39	2.4112	17 15 14.3	7.737
6	14 32 16.08	2.9635	9 30 39.0	11.601	6	16 24 27.15	2.4142	17 22 55.3	7.628
7	14 34 31.97	2.9662	9 42 13.4	11.547	7	16 26 52.10	2.4173	17 30 29.7	7.517
8	14 36 48.03	2.9690	9 53 44.6	11.492	8	16 29 17.23	2.4204	17 37 57.4	7.406
9	14 39 4.25	2.9718	10 5 12.4	11.434	9	16 31 42.55	2.4234	17 45 18.4	7.294
10	14 41 20.64	2.9746	10 16 36.7	11.376	10	16 34 8.04	2.4263	17 52 32.6	7.181
11	14 43 37.20	2.9774	10 27 57.5	11.317	11	16 36 33.71	2.4293	17 59 40.1	7.067
12	14 45 53.93	2.9803	10 39 14.7	11.256	12	16 38 59.56	2.4322	18 6 40.7	6.952
13	14 48 10.83	2.9832	10 50 28.2	11.193	13	16 41 25.58	2.4351	18 13 34.3	6.836
14	14 50 27.91	2.9862	11 1 37.9	11.130	14	16 43 51.77	2.4379	18 20 21.0	6.720
15	14 52 45.17	2.9891	11 12 43.8	11.066	15	16 46 18.13	2.4408	18 27 0.7	6.602
16	14 55 2.60	2.9920	11 23 45.8	11.000	16	16 48 44.66	2.4436	18 33 33.3	6.483
17	14 57 20.21	2.9951	11 34 43.8	10.932	17	16 51 11.36	2.4463	18 39 58.7	6.363
18	14 59 38.01	2.9982	11 45 37.7	10.864	18	16 53 38.22	2.4489	18 46 16.9	6.243
19	15 1 55.99	2.3012	11 56 27.5	10.795	19	16 56 5.23	2.4515	18 52 27.9	6.122
20	15 4 14.16	2.3043	12 7 13.1	10.725	20	16 58 32.40	2.4541	18 58 31.6	6.001
21	15 6 32.51	2.3074	12 17 54.5	10.653	21	17 0 59.72	2.4566	19 4 28.0	5.878
22	15 8 51.05	2.3106	12 28 31.5	10.580	22	17 3 27.19	2.4590	19 10 17.0	5.755
23	15 11 9.78	2.3137	S. 12° 39' 4.1"	10.505	23	17 5 54.80	2.4614	S. 19° 15' 58.6"	5.631
TUESDAY 14.					THURSDAY 16.				
0	15 13 28.69	2.3168	S. 12° 49' 32.1"	10.429	0	17 8 22.56	2.4638	S. 19° 21' 32.7"	5.506
1	15 15 47.79	2.3200	12 59 55.6	10.352	1	17 10 50.46	2.4661	19 26 59.3	5.380
2	15 18 7.09	2.3233	13 10 14.4	10.275	2	17 13 18.49	2.4684	19 32 18.3	5.253
3	15 20 26.59	2.3266	13 20 28.6	10.197	3	17 15 46.66	2.4706	19 37 29.7	5.126
4	15 22 46.28	2.3298	13 30 38.0	10.116	4	17 18 14.96	2.4727	19 42 33.4	4.998
5	15 25 6.16	2.3330	13 40 42.5	10.034	5	17 20 43.38	2.4747	19 47 29.4	4.870
6	15 27 26.24	2.3362	13 50 42.1	9.952	6	17 23 11.92	2.4767	19 52 17.8	4.742
7	15 29 46.51	2.3395	14 0 36.7	9.868	7	17 25 40.58	2.4786	19 56 58.4	4.612
8	15 32 6.98	2.3428	14 10 26.2	9.783	8	17 28 9.35	2.4804	20 1 31.2	4.481
9	15 34 27.65	2.3461	14 20 10.6	9.697	9	17 30 38.23	2.4822	20 5 56.1	4.350
10	15 36 48.52	2.3494	14 29 49.8	9.609	10	17 33 7.22	2.4840	20 10 13.2	4.219
11	15 39 9.58	2.3527	14 39 23.7	9.520	11	17 35 36.31	2.4856	20 14 22.4	4.087
12	15 41 30.84	2.3560	14 48 52.2	9.430	12	17 38 5.49	2.4871	20 18 23.6	3.954
13	15 43 52.30	2.3593	14 58 15.3	9.340	13	17 40 34.76	2.4886	20 22 16.9	3.821
14	15 46 13.96	2.3626	15 7 33.0	9.248	14	17 43 4.12	2.4901	20 26 2.2	3.687
15	15 48 35.81	2.3659	15 16 45.1	9.154	15	17 45 33.57	2.4915	20 29 39.4	3.553
16	15 50 57.67	2.3692	15 25 51.5	9.060	16	17 48 3.10	2.4927	20 33 8.6	3.419
17	15 53 20.12	2.3725	15 34 52.3	8.966	17	17 50 32.70	2.4938	20 36 29.7	3.284
18	15 55 42.57	2.3758	15 43 47.4	8.869	18	17 53 2.36	2.4949	20 39 42.7	3.149
19	15 58 5.22	2.3791	15 52 36.6	8.771	19	17 55 32.09	2.4960	20 42 47.6	3.013
20	16 0 28.06	2.3824	16 1 19.9	8.672	20	17 58 1.88	2.4969	20 45 44.3	2.877
21	16 2 51.10	2.3857	16 9 57.3	8.573	21	18 0 31.72	2.4978	20 48 32.9	2.741
22	16 5 14.34	2.3889	16 18 28.7	8.472	22	18 3 1.61	2.4986	20 51 13.3	2.604
23	16 7 37.77	2.3921	16 26 54.0	8.370	23	18 5 31.55	2.4993	20 53 45.4	2.467
24	16 10 1.39	2.3953	S. 16° 35' 13.1"	8.267	24	18 8 1.53	2.4999	S. 20° 56' 9.3"	2.330

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 17.					SUNDAY 19.				
0	<sup>h</sup> 18 <sup>m</sup> 8 <sup>s</sup> 1.53	2.4999	S. 20° 56' 9.3"	2.330	0	<sup>h</sup> 20 <sup>m</sup> 7 <sup>s</sup> 1.16	2.4949	S. 20° 10' 34.8"	4.108
1	18 10 31.54	2.5004	20 58 25.0	2.192	1	20 9 26.55	2.4913	20 6 24.6	4.320
2	18 13 1.58	2.5008	21 0 32.4	2.055	2	20 11 51.72	2.4176	20 2 7.2	4.351
3	18 15 31.64	2.5012	21 2 31.6	1.917	3	20 14 16.66	2.4139	19 57 42.5	4.472
4	18 18 1.72	2.5014	21 4 22.5	1.779	4	20 16 41.38	2.4102	19 53 10.6	4.591
5	18 20 31.81	2.5016	21 6 5.1	1.642	5	20 19 5.88	2.4064	19 48 31.6	4.709
6	18 23 1.91	2.5017	21 7 39.5	1.504	6	20 21 30.15	2.4026	19 43 45.5	4.827
7	18 25 32.01	2.5017	21 9 5.6	1.365	7	20 23 54.19	2.3987	19 38 52.4	4.944
8	18 28 2.11	2.5016	21 10 23.3	1.226	8	20 26 17.99	2.3947	19 33 52.2	5.061
9	18 30 32.20	2.5014	21 11 32.7	1.087	9	20 28 41.55	2.3907	19 28 45.1	5.176
10	18 33 2.28	2.5012	21 12 33.8	0.949	10	20 31 4.87	2.3866	19 23 31.1	5.290
11	18 35 32.34	2.5008	21 13 26.6	0.810	11	20 33 27.94	2.3825	19 18 10.3	5.402
12	18 38 2.37	2.5003	21 14 11.0	0.672	12	20 35 50.77	2.3783	19 12 42.8	5.514
13	18 40 32.37	2.4997	21 14 47.2	0.534	13	20 38 13.34	2.3741	19 7 8.6	5.626
14	18 43 2.34	2.4991	21 15 15.1	0.395	14	20 40 35.66	2.3698	19 1 27.7	5.737
15	18 45 32.26	2.4983	21 15 34.6	0.256	15	20 42 57.72	2.3655	18 55 40.2	5.846
16	18 48 2.13	2.4975	21 15 45.8	- 0.118	16	20 45 19.52	2.3612	18 49 46.2	5.953
17	18 50 31.95	2.4966	21 15 48.8	+ 0.019	17	20 47 41.06	2.3568	18 43 45.8	6.060
18	18 53 1.72	2.4956	21 15 43.5	0.157	18	20 50 2.34	2.3524	18 37 39.0	6.167
19	18 55 31.42	2.4944	21 15 29.9	0.995	19	20 52 23.35	2.3479	18 31 25.8	6.272
20	18 58 1.05	2.4932	21 15 8.1	0.432	20	20 54 44.09	2.3433	18 25 6.3	6.376
21	19 0 30.61	2.4920	21 14 38.0	0.570	21	20 57 4.55	2.3388	18 18 40.7	6.479
22	19 3 0.09	2.4906	21 13 59.7	0.707	22	20 59 24.74	2.3343	18 12 8.9	6.581
23	19 5 29.48	2.4890	S. 21° 13' 13.2"	0.843	23	21 1 44.66	2.3297	S. 18° 5' 31.0"	6.682
SATURDAY 18.					MONDAY 20.				
0	19 7 58.77	2.4874	S. 21° 12' 18.5"	0.980	0	21 4 4.31	2.3251	S. 17° 58' 47.1"	6.781
1	19 10 27.97	2.4858	21 11 15.6	1.116	1	21 6 23.68	2.3204	17 51 57.3	6.880
2	19 12 57.07	2.4841	21 10 4.6	1.252	2	21 8 42.76	2.3157	17 45 1.5	6.978
3	19 15 26.06	2.4822	21 8 45.4	1.388	3	21 11 1.56	2.3110	17 37 59.9	7.075
4	19 17 54.94	2.4803	21 7 18.1	1.523	4	21 13 20.08	2.3062	17 30 52.5	7.170
5	19 20 23.70	2.4783	21 5 42.7	1.658	5	21 15 38.31	2.3015	17 23 39.5	7.263
6	19 22 52.34	2.4762	21 3 59.2	1.792	6	21 17 56.26	2.2967	17 16 20.9	7.356
7	19 25 20.85	2.4741	21 2 7.7	1.925	7	21 20 13.92	2.2919	17 8 56.8	7.448
8	19 27 49.23	2.4718	21 0 8.2	2.058	8	21 22 31.29	2.2872	17 1 27.1	7.540
9	19 30 17.47	2.4695	20 58 0.7	2.191	9	21 24 48.38	2.2824	16 53 52.0	7.629
10	19 32 45.57	2.4670	20 55 45.3	2.323	10	21 27 5.18	2.2776	16 46 11.6	7.718
11	19 35 13.51	2.4644	20 53 22.0	2.455	11	21 29 21.69	2.2727	16 38 25.9	7.806
12	19 37 41.30	2.4618	20 50 50.7	2.587	12	21 31 37.90	2.2678	16 30 34.9	7.891
13	19 40 8.93	2.4592	20 48 11.6	2.717	13	21 33 53.82	2.2629	16 22 38.8	7.978
14	19 42 36.40	2.4564	20 45 24.7	2.846	14	21 36 9.45	2.2581	16 14 37.6	8.061
15	19 45 3.70	2.4536	20 42 30.1	2.975	15	21 38 24.79	2.2532	16 6 31.5	8.144
16	19 47 30.83	2.4507	20 39 27.7	3.104	16	21 40 39.84	2.2483	15 58 20.4	8.226
17	19 49 57.79	2.4478	20 36 17.6	3.232	17	21 42 54.59	2.2434	15 50 4.4	8.307
18	19 52 24.57	2.4447	20 32 59.8	3.360	18	21 45 9.05	2.2386	15 41 43.6	8.386
19	19 54 51.16	2.4416	20 29 34.4	3.486	19	21 47 23.22	2.2337	15 33 18.1	8.464
20	19 57 17.56	2.4383	20 26 1.5	3.612	20	21 49 37.09	2.2288	15 24 47.9	8.542
21	19 59 43.76	2.4350	20 22 21.0	3.737	21	21 51 50.67	2.2239	15 16 13.1	8.618
22	20 2 9.76	2.4317	20 18 33.0	3.862	22	21 54 3.96	2.2190	15 7 33.8	8.693
23	20 4 35.56	2.4283	20 14 37.6	3.985	23	21 56 16.95	2.2141	14 58 50.0	8.766
24	20 7 1.16	2.4249	S. 20° 10' 34.8"	4.108	24	21 58 29.65	2.2092	S. 14° 50' 1.9"	8.838

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 21.					THURSDAY 23.				
0	<sup>h</sup> 21 <sup>m</sup> 58 <sup>s</sup> 29.65	2.2092	S. 14° 50' 1.9	8.838	0	<sup>h</sup> 23 <sup>m</sup> 39 <sup>s</sup> 19.64	2.0042	S. 6° 43' 44.6	11.012
1	22 0 42.06	2.2044	14 41 9.5	8.909	1	23 41 19.79	2.0008	6 32 43.3	11.031
2	22 2 54.18	2.1996	14 32 12.8	8.980	2	23 43 19.74	1.9975	6 21 40.9	11.050
3	22 5 6.01	2.1947	14 23 11.9	9.049	3	23 45 19.49	1.9942	6 10 37.3	11.069
4	22 7 17.55	2.1899	14 14 6.9	9.117	4	23 47 19.05	1.9910	5 59 32.6	11.086
5	22 9 28.80	2.1852	14 4 57.9	9.183	5	23 49 18.41	1.9878	5 48 27.0	11.102
6	22 11 39.77	2.1804	13 55 45.0	9.248	6	23 51 17.58	1.9847	5 37 20.4	11.117
7	22 13 50.45	2.1756	13 46 28.1	9.313	7	23 53 16.57	1.9817	5 26 12.9	11.132
8	22 16 0.84	2.1708	13 37 7.4	9.376	8	23 55 15.38	1.9786	5 15 4.6	11.146
9	22 18 10.94	2.1660	13 27 43.0	9.438	9	23 57 14.00	1.9756	5 3 55.4	11.160
10	22 20 20.76	2.1613	13 18 14.9	9.499	10	23 59 12.45	1.9727	4 52 45.4	11.172
11	22 22 30.30	2.1566	13 8 43.1	9.559	11	0 1 10.72	1.9698	4 41 34.8	11.182
12	22 24 39.55	2.1518	12 59 7.8	9.617	12	0 3 8.82	1.9669	4 30 23.6	11.192
13	22 26 48.52	2.1472	12 49 29.0	9.673	13	0 5 6.75	1.9641	4 19 11.8	11.201
14	22 28 57.21	2.1426	12 39 46.8	9.729	14	0 7 4.52	1.9614	4 7 59.5	11.210
15	22 31 5.63	2.1380	12 30 1.2	9.787	15	0 9 2.12	1.9587	3 56 46.6	11.218
16	22 33 13.77	2.1334	12 20 12.3	9.841	16	0 10 59.56	1.9561	3 45 33.3	11.225
17	22 35 21.64	2.1288	12 10 20.3	9.894	17	0 12 56.85	1.9535	3 34 19.6	11.231
18	22 37 29.23	2.1242	12 0 25.1	9.946	18	0 14 53.98	1.9509	3 23 5.6	11.236
19	22 39 36.55	2.1197	11 50 26.8	9.997	19	0 16 50.96	1.9484	3 11 51.3	11.240
20	22 41 43.60	2.1152	11 40 25.5	10.046	20	0 18 47.79	1.9460	3 0 36.8	11.244
21	22 43 50.38	2.1107	11 30 21.3	10.094	21	0 20 44.48	1.9437	2 49 22.1	11.247
22	22 45 56.89	2.1063	11 20 14.2	10.142	22	0 22 41.03	1.9413	2 38 7.2	11.248
23	22 48 3.14	2.1020	S. 11° 10' 4.2	10.189	23	0 24 37.44	1.9390	S. 2° 26' 52.3	11.249
WEDNESDAY 22.					FRIDAY 24.				
0	22 50 9.13	2.0977	S. 10° 59' 51.5	10.234	0	0 26 33.71	1.9368	S. 2° 15' 37.3	11.250
1	22 52 14.86	2.0933	10 49 36.1	10.278	1	0 28 29.85	1.9346	2 4 22.3	11.249
2	22 54 20.33	2.0890	10 39 18.1	10.322	2	0 30 25.86	1.9325	1 53 7.4	11.248
3	22 56 25.54	2.0847	10 28 57.5	10.364	3	0 32 21.75	1.9304	1 41 52.5	11.246
4	22 58 30.50	2.0805	10 18 34.4	10.405	4	0 34 17.51	1.9283	1 30 37.8	11.243
5	23 0 35.20	2.0763	10 8 8.9	10.444	5	0 36 13.15	1.9264	1 19 23.3	11.240
6	23 2 39.65	2.0722	9 57 41.1	10.483	6	0 38 8.68	1.9245	1 8 9.0	11.236
7	23 4 43.86	2.0681	9 47 10.9	10.521	7	0 40 4.09	1.9226	0 56 55.0	11.231
8	23 6 47.82	2.0639	9 36 38.5	10.558	8	0 41 59.39	1.9207	0 45 41.3	11.225
9	23 8 51.53	2.0598	9 26 3.9	10.594	9	0 43 54.58	1.9189	0 34 28.0	11.218
10	23 10 55.00	2.0558	9 15 27.2	10.629	10	0 45 49.66	1.9172	0 23 15.1	11.211
11	23 12 58.23	2.0519	9 4 48.4	10.663	11	0 47 44.65	1.9156	0 12 2.6	11.204
12	23 15 1.23	2.0481	8 54 7.6	10.696	12	0 49 39.54	1.9140	S. 0° 0' 50.6	11.196
13	23 17 4.00	2.0442	8 43 24.9	10.727	13	0 51 34.33	1.9124	N. 0° 10' 20.9	11.186
14	23 19 6.53	2.0403	8 32 40.4	10.758	14	0 53 29.03	1.9109	0 21 31.7	11.175
15	23 21 8.83	2.0364	8 21 54.0	10.788	15	0 55 23.64	1.9095	0 32 41.9	11.164
16	23 23 10.90	2.0327	8 11 5.8	10.817	16	0 57 18.17	1.9081	0 43 51.4	11.153
17	23 25 12.75	2.0290	8 0 16.0	10.844	17	0 59 12.61	1.9067	0 55 0.2	11.141
18	23 27 14.38	2.0253	7 49 24.5	10.871	18	1 1 6.97	1.9054	1 6 8.3	11.128
19	23 29 15.79	2.0217	7 38 31.5	10.897	19	1 3 1.26	1.9042	1 17 15.6	11.114
20	23 31 16.98	2.0181	7 27 36.9	10.922	20	1 4 55.47	1.9029	1 28 22.0	11.100
21	23 33 17.96	2.0146	7 16 40.9	10.945	21	1 6 49.61	1.9017	1 39 27.6	11.086
22	23 35 18.73	2.0111	7 5 43.5	10.968	22	1 8 43.68	1.9007	1 50 32.3	11.070
23	23 37 19.29	2.0076	6 54 44.7	10.991	23	1 10 37.69	1.8997	2 1 36.0	11.053
24	23 39 19.64	2.0042	S. 6° 43' 44.6	11.012	24	1 12 31.64	1.8987	N. 2° 12' 38.6	11.035

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 25.					MONDAY 27.				
0	1 12 31.64	1.8987	N. 2 12 38.6	11.035	0	2 43 28.20	1.9099	N. 10 31' 27"	9.503
1	1 14 25.53	1.8977	2 23 40.2	11.018	1	2 45 22.79	1.9105	10 40 31.5	9.457
2	1 16 19.37	1.8968	2 34 40.8	11.001	2	2 47 17.46	1.9119	10 49 57.5	9.411
3	1 18 13.15	1.8959	2 45 40.3	10.983	3	2 49 12.22	1.9134	10 59 20.8	9.364
4	1 20 6.88	1.8951	2 56 38.7	10.963	4	2 51 7.07	1.9149	11 8 41.2	9.318
5	1 22 0.57	1.8944	3 7 35.8	10.942	5	2 53 2.01	1.9164	11 17 58.7	9.267
6	1 23 54.21	1.8937	3 18 31.7	10.921	6	2 54 57.04	1.9180	11 27 13.2	9.217
7	1 25 47.81	1.8931	3 29 26.3	10.899	7	2 56 52.17	1.9196	11 36 24.8	9.168
8	1 27 41.38	1.8926	3 40 19.6	10.877	8	2 58 47.39	1.9219	11 45 33.4	9.119
9	1 29 34.92	1.8921	3 51 11.6	10.855	9	3 0 42.71	1.9229	11 54 39.1	9.069
10	1 31 28.43	1.8916	4 2 2.2	10.832	10	3 2 38.14	1.9247	12 3 41.7	9.017
11	1 33 21.91	1.8911	4 12 51.4	10.807	11	3 4 33.67	1.9264	12 12 41.2	8.965
12	1 35 15.36	1.8907	4 23 39.1	10.782	12	3 6 29.31	1.9282	12 21 37.5	8.912
13	1 37 8.79	1.8904	4 34 25.3	10.757	13	3 8 25.06	1.9301	12 30 30.7	8.860
14	1 39 2.20	1.8901	4 45 10.0	10.732	14	3 10 20.92	1.9319	12 39 20.7	8.807
15	1 40 55.60	1.8898	4 55 53.1	10.705	15	3 12 16.89	1.9338	12 48 7.6	8.754
16	1 42 48.98	1.8897	5 6 34.6	10.678	16	3 14 12.98	1.9358	12 56 51.2	8.699
17	1 44 42.36	1.8896	5 17 14.5	10.651	17	3 16 9.19	1.9378	13 5 31.5	8.643
18	1 46 35.73	1.8894	5 27 52.7	10.622	18	3 18 5.52	1.9398	13 14 8.4	8.587
19	1 48 29.09	1.8894	5 38 29.2	10.593	19	3 20 1.97	1.9419	13 22 42.0	8.532
20	1 50 22.46	1.8895	5 49 3.9	10.563	20	3 21 58.55	1.9441	13 31 12.2	8.476
21	1 52 15.83	1.8896	5 59 36.8	10.533	21	3 23 55.26	1.9462	13 39 39.1	8.419
22	1 54 9.21	1.8897	6 10 7.9	10.503	22	3 25 52.10	1.9484	13 48 2.5	8.361
23	1 56 2.59	1.8898	N. 6 20 37.1	10.472	23	3 27 49.07	1.9506	N. 13 56 22.4	8.303
SUNDAY 26.					TUESDAY 28.				
0	1 57 55.98	1.8900	N. 6 31 4.5	10.441	0	3 29 46.17	1.9528	N. 14 4 38.8	8.943
1	1 59 49.39	1.8903	6 41 30.0	10.408	1	3 31 43.41	1.9551	14 12 51.6	8.183
2	2 1 42.82	1.8906	6 51 53.5	10.374	2	3 33 40.79	1.9574	14 21 0.8	8.123
3	2 3 36.26	1.8909	7 2 14.9	10.340	3	3 35 38.30	1.9597	14 29 6.4	8.063
4	2 5 29.73	1.8913	7 12 34.3	10.306	4	3 37 35.95	1.9621	14 37 8.4	8.002
5	2 7 23.22	1.8917	7 22 51.6	10.271	5	3 39 33.75	1.9646	14 45 6.7	7.941
6	2 9 16.74	1.8922	7 33 6.8	10.236	6	3 41 31.70	1.9670	14 53 1.3	7.878
7	2 11 10.29	1.8928	7 43 19.9	10.201	7	3 43 29.79	1.9694	15 0 52.1	7.815
8	2 13 3.88	1.8934	7 53 30.9	10.165	8	3 45 28.03	1.9720	15 8 39.1	7.752
9	2 14 57.50	1.8941	8 3 39.7	10.127	9	3 47 26.43	1.9746	15 16 22.4	7.689
10	2 16 51.17	1.8948	8 13 46.2	10.089	10	3 49 24.98	1.9771	15 24 1.8	7.624
11	2 18 44.88	1.8955	8 23 50.4	10.051	11	3 51 23.68	1.9796	15 31 37.2	7.558
12	2 20 38.63	1.8962	8 33 52.3	10.012	12	3 53 22.53	1.9822	15 39 8.7	7.493
13	2 22 32.43	1.8971	8 43 51.8	9.973	13	3 55 21.54	1.9848	15 46 36.3	7.427
14	2 24 26.28	1.8980	8 53 49.0	9.933	14	3 57 20.71	1.9875	15 53 59.9	7.359
15	2 26 20.19	1.8989	9 3 43.8	9.892	15	3 59 20.04	1.9902	16 1 19.4	7.292
16	2 28 14.15	1.8998	9 13 36.1	9.851	16	4 1 19.54	1.9930	16 8 34.9	7.224
17	2 30 8.17	1.9008	9 23 25.9	9.810	17	4 3 19.20	1.9958	16 15 46.3	7.155
18	2 32 2.25	1.9019	9 33 13.3	9.768	18	4 5 19.03	1.9986	16 22 53.5	7.086
19	2 33 56.40	1.9031	9 42 58.1	9.725	19	4 7 19.03	2.0013	16 29 56.6	7.017
20	2 35 50.62	1.9042	9 52 40.3	9.681	20	4 9 19.19	2.0041	16 36 55.5	6.946
21	2 37 44.90	1.9054	10 2 19.9	9.637	21	4 11 19.52	2.0069	16 43 50.1	6.875
22	2 39 39.26	1.9066	10 11 56.8	9.593	22	4 13 20.02	2.0098	16 50 40.5	6.804
23	2 41 33.69	1.9079	10 21 31.1	9.549	23	4 15 20.69	2.0127	16 57 26.6	6.732
24	2 43 28.20	1.9092	N. 10 31 2.7	9.503	24	4 17 21.54	2.0156	N. 17 4 8.3	6.660





## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Fomalhaut W.	83° 55' 8"	3284	85° 19' 38"	3280	86° 44' 13"	3275	88° 8' 54"	3270
	α Pegasi W.	68 52 25	3491	70 12 59	3480	71 33 46	3469	72 54 45	3458
	α Arietis W.	25 56 13	3977	27 8 15	3885	28 21 50	3804	29 36 48	3733
	Pollux E.	55 10 36	3114	53 42 43	3112	52 14 48	3110	50 46 51	3109
	Sun E.	72 4 24	3422	70 42 32	3418	69 20 36	3414	67 58 35	3409
2	Fomalhaut W.	95 13 46	3244	96 39 3	3238	98 4 27	3232	99 29 58	3227
	α Pegasi W.	79 42 44	3404	81 4 56	3394	82 27 19	3385	83 49 53	3374
	α Arietis W.	36 7 50	3479	37 28 38	3442	38 50 7	3408	40 12 15	3375
	Pollux E.	43 26 29	3097	41 58 16	3096	40 30 1	3093	39 1 43	3092
	Sun E.	61 6 57	3378	59 44 15	3370	58 21 24	3363	56 58 25	3354
3	α Arietis W.	47 11 27	3242	48 36 47	3218	50 2 35	3196	51 28 49	3175
	Aldebaran W.	13 28 38	2969	14 50 29	2956	16 30 37	2944	18 2 0	2932
	Pollux E.	31 39 59	3094	30 11 42	3098	28 43 30	3105	27 15 26	3113
	Sun E.	50 0 57	3307	48 36 54	3297	47 12 39	3286	45 48 11	3276
4	α Arietis W.	58 46 4	3078	60 14 41	3060	61 43 39	3043	63 12 59	3026
	Aldebaran W.	25 42 42	2873	27 15 36	2860	28 48 46	2848	30 22 11	2836
	Sun E.	38 42 37	3218	37 16 49	3205	35 50 46	3193	34 24 29	3181
5	α Arietis W.	70 44 50	2944	72 16 13	2922	73 47 55	2914	75 19 56	2899
	Aldebaran W.	38 13 15	2774	39 48 17	2762	41 23 35	2750	42 59 9	2737
	Sun E.	27 9 17	3118	25 41 29	3105	24 13 26	3092	22 45 7	3080
9	Sun W.	22 0 5	2741	23 35 50	2732	25 11 47	2723	26 47 56	2715
	Mars E.	61 1 33	2643	59 23 37	2637	57 45 32	2630	56 7 18	2625
	Jupiter E.	77 52 55	2448	76 10 28	2440	74 27 50	2432	72 45 1	2424
	Antares E.	89 26 38	2470	87 44 43	2462	86 2 37	2455	84 20 21	2448
10	Sun W.	34 51 20	2678	36 28 30	2672	38 5 48	2666	39 43 14	2660
	Mars E.	47 54 23	2602	46 15 31	2599	44 36 35	2596	42 57 35	2595
	Jupiter E.	64 8 35	2395	62 24 53	2389	60 41 3	2384	58 57 6	2380
	Antares E.	75 46 41	2419	74 3 33	2414	72 20 18	2409	70 36 56	2405
11	Sun W.	47 52 15	2635	49 30 23	2631	51 8 36	2626	52 46 55	2623
	Mars E.	34 42 28	2601	33 3 34	2605	31 24 46	2612	29 46 7	2621
	Jupiter E.	50 15 50	2362	48 31 20	2359	46 46 46	2356	45 2 8	2354
	Antares E.	61 58 54	2391	60 15 6	2389	58 31 16	2389	56 47 25	2389
12	Sun W.	60 59 38	2608	62 38 22	2605	64 17 10	2603	65 56 1	2601
	Jupiter E.	36 18 27	2350	34 33 41	2351	32 48 56	2353	31 4 13	2355
	Antares E.	48 8 17	2394	46 24 34	2398	44 40 56	2403	42 57 25	2408
13	Sun W.	74 10 49	2595	75 49 51	2593	77 28 55	2592	79 8 1	2591
	Antares E.	34 22 23	2457	32 40 9	2473	30 58 18	2492	29 16 54	2516
	α Aquilæ E.	83 5 12	2889	81 32 39	2894	80 0 12	2900	78 27 53	2907
14	Sun W.	87 23 36	2591	89 2 43	2591	90 41 50	2592	92 20 56	2593
	Spica W.	28 1 38	2438	29 44 19	2422	31 27 22	2410	33 10 43	2399
	α Aquilæ E.	70 49 10	2965	69 18 13	2981	67 47 36	2999	66 17 22	3020
	Fomalhaut E.	103 45 24	2522	102 4 42	2520	100 23 56	2517	98 43 6	2515

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Fomalhaut	W.	89° 33' 40"	3265	90° 58' 32"	3260	92° 23' 30"	3254	93° 48' 35"	3249
	α Pegasi	W.	74 15 56	3446	75 37 20	3436	76 58 56	3425	78 20 44	3415
	α Arietis	W.	30 53 0	3671	32 10 18	3615	33 28 36	3565	34 47 48	3520
	Pollux	E.	49 18 52	3106	47 50 50	3105	46 22 46	3102	44 54 39	3100
	SUN	E.	66 36 29	3404	65 14 17	3398	63 51 58	3391	62 29 31	3385
2	Fomalhaut	W.	100 55 35	3221	102 21 19	3215	103 47 10	3210	105 13 7	3204
	α Pegasi	W.	85 12 39	3365	86 35 36	3355	87 58 44	3345	89 22 3	3337
	α Arietis	W.	41 35 0	3345	42 58 20	3317	44 22 12	3290	45 46 35	3265
	Pollux	E.	37 33 23	3091	36 5 2	3090	34 36 40	3091	33 8 19	3092
	SUN	E.	55 35 16	3345	54 11 57	3337	52 48 28	3327	51 24 48	3318
3	α Arietis	W.	52 55 28	3155	54 22 31	3135	55 49 58	3115	57 17 49	3096
	Aldebaran	W.	19 33 38	2920	21 5 32	2908	22 37 41	2897	24 10 4	2885
	Pollux	E.	25 47 32	3194	24 19 52	3141	22 52 32	3163	21 25 39	3193
	SUN	E.	44 23 31	3265	42 58 38	3253	41 33 31	3242	40 8 11	3230
4	α Arietis	W.	64 42 40	3009	66 12 42	2993	67 43 4	2976	69 13 47	2960
	Aldebaran	W.	31 55 52	2925	33 29 48	2812	35 4 0	2799	36 38 29	2786
	SUN	E.	32 57 57	3168	31 31 10	3156	30 4 8	3143	28 36 50	3130
5	α Arietis	W.	76 52 16	2884	78 24 55	2870	79 57 52	2856	81 31 7	2842
	Aldebaran	W.	44 35 0	2794	46 11 8	2719	47 47 32	2699	49 24 13	2687
	SUN	E.	21 16 33	3068	19 47 44	3056	18 18 40	3045	16 49 23	3034
9	SUN	W.	28 24 16	2707	30 0 47	2699	31 37 28	2692	33 14 19	2684
	MARS	E.	54 28 57	2619	52 50 28	2614	51 11 52	2610	49 33 10	2606
	JUPITER	E.	71 2 1	2418	69 18 52	2412	67 35 35	2406	65 52 9	2401
	Antares	E.	82 37 55	2441	80 55 19	2435	79 12 34	2429	77 29 41	2424
10	SUN	W.	41 20 48	2655	42 58 29	2649	44 36 18	2644	46 14 13	2639
	MARS	E.	41 18 33	2594	39 39 30	2595	38 0 28	2596	36 21 27	2597
	JUPITER	E.	57 13 2	2375	55 28 52	2372	53 44 37	2368	52 0 16	2364
	Antares	E.	68 53 29	2402	67 9 57	2396	65 26 20	2396	63 42 39	2393
11	SUN	W.	54 25 19	2620	56 3 47	2616	57 42 20	2613	59 20 57	2610
	MARS	E.	28 7 40	2632	26 29 28	2645	24 51 34	2663	23 14 4	2686
	JUPITER	E.	43 17 27	2353	41 32 44	2351	39 47 59	2350	38 3 13	2350
	Antares	E.	55 3 34	2389	53 19 43	2389	51 35 52	2390	49 52 3	2392
12	SUN	W.	67 34 54	2599	69 13 50	2598	70 52 48	2596	72 31 48	2596
	JUPITER	E.	29 19 34	2358	27 34 59	2363	25 50 31	2368	24 6 11	2376
	Antares	E.	41 14 2	2415	39 30 48	2422	37 47 45	2432	36 4 56	2443
13	SUN	W.	80 47 8	2591	82 26 15	2591	84 5 22	2591	85 44 29	2591
	Antares	E.	27 36 3	2544	25 55 51	2579	24 16 27	2622	22 38 2	2678
	α Aquilæ	E.	76 55 43	2616	75 23 44	2625	73 51 57	2637	72 20 25	2650
14	SUN	W.	94 0 1	2593	95 39 5	2594	97 18 8	2595	98 57 10	2596
	Spica	W.	34 54 19	2390	36 38 8	2382	38 22 8	2376	40 6 17	2371
	α Aquilæ	E.	64 47 34	2642	63 18 13	2666	61 49 22	2694	60 21 5	2714
	Fomalhaut	E.	97 2 14	2514	95 21 20	2514	93 40 26	2514	91 59 32	2515

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
15	SUN W.	100° 36' 10"	2598	102° 15' 8"	2599	103° 54' 4"	2601	105° 32' 57"	2603
	Spica W.	41 50 33	2367	43 34 55	2363	45 19 23	2360	47 3 55	2358
	MARS W.	21 1 26	2687	22 38 24	2680	24 15 57	2640	25 53 58	2622
	α Aquilæ E.	58 53 24	3157	57 26 23	3193	56 0 6	3234	54 34 37	3278
	Fomalhaut E.	90 18 39	2516	88 37 48	2517	86 56 59	2519	85 16 12	2522
16	SUN W.	113 46 43	2615	115 25 18	2618	117 3 49	2621	118 42 16	2624
	Spica W.	55 47 5	2355	57 31 44	2356	59 16 22	2356	61 1 0	2357
	MARS W.	34 8 23	2579	35 47 47	2575	37 27 16	2572	39 6 49	2571
	JUPITER W.	20 38 29	2405	22 21 56	2398	24 5 34	2399	25 49 20	2398
	α Aquilæ E.	47 41 49	3577	46 22 50	3659	45 5 19	3748	43 49 23	3848
	Fomalhaut E.	76 53 33	2545	75 13 22	2551	73 33 20	2159	71 53 28	2566
	α Pegasi E.	92 42 5	2681	91 5 0	2683	89 27 57	2686	87 50 58	2689
17	Spica W.	69 43 28	2370	71 27 46	2373	73 12 0	2376	74 56 9	2380
	MARS W.	47 24 52	2572	49 4 26	2573	50 43 58	2575	52 23 27	2578
	JUPITER W.	34 29 4	2384	36 13 1	2386	37 56 56	2388	39 40 48	2391
	Antares W.	24 40 59	2617	26 19 31	2586	27 58 45	2563	29 38 31	2544
	Fomalhaut E.	63 37 12	2619	61 58 43	2632	60 20 32	2647	58 42 41	2664
	α Pegasi E.	79 47 42	2722	78 11 31	2731	76 35 32	2740	74 59 45	2751
18	Spica W.	83 35 24	2403	85 18 54	2409	87 2 16	2415	88 45 29	2422
	MARS W.	60 39 43	2598	62 18 41	2604	63 57 31	2609	65 36 14	2614
	JUPITER W.	48 18 55	2411	50 2 14	2416	51 45 26	2421	53 28 31	2426
	Antares W.	38 2 12	2498	39 43 28	2494	41 24 49	2492	43 6 13	2492
	Fomalhaut E.	50 39 35	2769	49 4 27	2797	47 29 55	2827	45 56 2	2860
	α Pegasi E.	67 5 1	2824	65 31 4	2843	63 57 32	2863	62 24 26	2884
19	Spica W.	97 19 15	2457	99 1 29	2465	100 43 32	2473	102 25 23	2482
	MARS W.	73 47 45	2649	75 25 31	2656	77 3 13	2663	78 40 42	2672
	JUPITER W.	62 1 46	2459	63 43 57	2467	65 25 57	2475	67 7 45	2483
	Antares W.	51 33 0	2509	53 14 11	2506	54 55 16	2510	56 36 15	2516
	Fomalhaut E.	38 18 53	3090	36 50 31	3154	35 23 27	3226	33 57 49	3307
	α Pegasi E.	54 46 36	3023	53 16 52	3059	51 47 52	3097	50 19 39	3139
	α Arietis E.	96 23 22	2577	94 43 55	2584	93 4 38	2591	91 25 31	2599
20	MARS W.	86 45 10	2718	88 21 26	2738	89 57 29	2738	91 33 18	2749
	JUPITER W.	75 33 52	2527	77 14 28	2536	78 54 51	2546	80 35 0	2556
	Antares W.	64 59 4	2550	66 39 8	2558	68 19 1	2566	69 58 43	2574
	α Pegasi E.	43 12 42	3415	41 50 42	3488	40 30 5	3569	39 10 57	3659
	α Arietis E.	83 12 51	2646	81 34 59	2657	79 57 21	2669	78 19 59	2680
	Aldebaran E.	114 46 37	2491	113 5 11	2500	111 23 58	2510	109 42 59	2520
21	JUPITER W.	88 52 13	2610	90 30 55	2621	92 9 22	2632	93 47 33	2643
	Antares W.	78 14 3	2623	79 52 27	2634	81 30 36	2645	83 8 30	2655
	α Aquilæ W.	40 27 32	4313	41 34 13	4312	42 42 28	4192	43 52 8	4042
	α Arietis E.	70 17 18	2747	68 41 41	2763	67 6 24	2779	65 31 28	2795
	Aldebaran E.	101 21 37	2572	99 42 4	2584	98 2 47	2595	96 23 45	2607
22	JUPITER W.	101 54 33	2704	103 31 8	2716	105 7 27	2729	106 43 29	2741
	Antares W.	91 14 16	2713	92 50 38	2725	94 26 44	2738	96 2 34	2750
	α Aquilæ W.	49 57 18	3767	51 12 55	3796	52 29 12	3825	53 46 4	3856

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Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
15	SUN W.	107 11 48	2604	108 50 37	2607	110 29 23	2610	112 8 5	2619
	Spica W.	48 48 30	2357	50 33 7	2355	52 17 46	2355	54 2 26	2355
	MARS W.	27 32 22	2610	29 11 4	2599	30 50 0	2591	32 29 7	2565
	α Aquilæ E.	53 10 0	3326	51 46 19	3380	50 23 40	3439	49 2 8	3505
	Fomalhaut E.	83 35 29	2525	81 54 51	2529	80 14 18	2534	78 33 52	2539
16	SUN W.	120 20 39	2627	121 58 57	2631	123 37 10	2635	125 15 17	2640
	Spica W.	62 45 36	2359	64 30 10	2362	66 14 40	2364	67 59 6	2367
	MARS W.	40 46 24	2569	42 26 1	2569	44 5 39	2569	45 45 16	2570
	JUPITER W.	27 33 12	2385	29 17 8	2384	31 1 6	2383	32 45 5	2383
	α Aquilæ E.	42 35 10	3959	41 22 50	4085	40 12 34	4294	39 4 31	4384
	Fomalhaut E.	70 13 46	2574	68 34 16	2585	66 55 0	2585	65 15 58	2607
	α Pegasi E.	86 14 4	2694	84 37 16	2700	83 0 36	2706	81 24 4	2713
17	Spica W.	76 40 13	2384	78 24 11	2389	80 8 2	2393	81 51 47	2398
	MARS W.	54 2 52	2582	55 42 12	2585	57 21 28	2589	59 0 38	2593
	JUPITER W.	41 24 35	2395	43 8 17	2398	44 51 55	2401	46 35 28	2405
	Antares W.	31 18 43	2330	32 59 15	2518	34 40 3	2510	36 21 3	2503
	Fomalhaut E.	57 5 13	2681	55 28 8	2700	53 51 28	2721	52 15 16	2744
	α Pegasi E.	73 24 13	2763	71 48 57	2777	70 13 59	2792	68 39 20	2807
18	Spica W.	90 28 33	2428	92 11 28	2434	93 54 14	2441	95 36 50	2449
	MARS W.	67 14 50	2620	68 53 18	2626	70 31 37	2634	72 9 46	2641
	JUPITER W.	55 11 28	2433	56 54 16	2439	58 36 55	2445	60 19 25	2452
	Antares W.	44 47 37	2492	46 29 1	2493	48 10 24	2495	49 51 44	2498
	Fomalhaut E.	44 22 52	2897	42 50 29	2938	41 18 58	2933	39 48 24	3034
	α Pegasi E.	60 51 47	2908	59 19 38	2933	57 48 1	2962	56 17 0	2991
19	Spica W.	104 7 2	2490	105 48 29	2499	107 29 43	2510	109 10 43	2520
	MARS W.	80 18 0	2681	81 55 6	2689	83 32 0	2699	85 8 41	2708
	JUPITER W.	68 49 22	2491	70 30 48	2499	72 12 2	2509	73 53 3	2517
	Antares W.	58 17 6	2522	59 57 49	2527	61 38 24	2535	63 18 49	2542
	Fomalhaut E.	32 33 46	3400	31 11 30	3508	29 51 15	3633	28 33 16	3778
	α Pegasi E.	48 52 17	3185	47 25 50	3235	46 0 22	3288	44 35 57	3349
	α Arietis E.	89 46 34	2607	88 7 49	2617	86 29 17	2626	84 50 57	2636
20	MARS W.	93 8 53	2760	94 44 14	2771	96 19 20	2782	97 54 11	2794
	JUPITER W.	82 14 56	2568	83 54 37	2577	85 34 4	2588	87 13 16	2599
	Antares W.	71 38 13	2584	73 17 30	2593	74 56 34	2603	76 35 25	2612
	α Pegasi E.	37 53 26	3759	36 37 41	3872	35 23 53	3999	34 12 12	4141
	α Arietis E.	76 42 52	2692	75 6 2	2705	73 29 29	2719	71 53 14	2733
	Aldebaran E.	108 2 14	2530	106 21 43	2540	104 41 26	2551	103 1 24	2562
21	JUPITER W.	95 25 29	2655	97 3 9	2667	98 40 33	2679	100 17 41	2691
	Antares W.	84 46 10	2606	86 23 35	2678	88 0 44	2689	89 37 38	2701
	α Aquilæ W.	45 3 6	3979	46 15 13	3912	47 28 21	3856	48 42 25	3809
	α Arietis E.	63 56 53	2611	62 22 40	2629	60 48 50	2647	59 15 23	2666
	Aldebaran E.	94 44 59	2618	93 6 29	2629	91 28 14	2641	89 50 15	2653
22	JUPITER W.	108 19 15	2753	109 54 44	2766	111 29 57	2778	113 4 54	2791
	Antares W.	97 38 7	2763	99 13 24	2775	100 48 25	2788	102 23 9	2801
	α Aquilæ W.	55 3 27	3641	56 21 17	3619	57 39 31	3599	58 58 6	3584

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22	$\alpha$ Arietis E.	57 42 20	9885	56 9 42	9906	54 37 31	9927	53 5 47	9750
	Aldebaran E.	88 12 32	9665	86 35 5	9677	84 57 54	9689	83 20 59	9701
23	$\alpha$ Aquilæ W.	60 16 58	3570	61 36 5	3557	62 55 26	3547	64 14 58	3540
	$\alpha$ Arietis E.	45 34 38	3081	44 6 5	3111	42 38 9	3144	41 10 53	3180
	Aldebaran E.	75 20 27	2762	73 45 9	2774	72 10 7	2786	70 35 21	2798
24	$\alpha$ Aquilæ W.	70 54 14	3522	72 14 14	3521	73 34 15	3522	74 54 15	3524
	Fomalhaut W.	35 53 29	3563	37 12 44	3525	38 32 41	3492	39 53 14	3464
	Aldebaran E.	62 45 22	2857	61 12 8	2868	59 39 8	2870	58 6 22	2891
25	$\alpha$ Aquilæ W.	81 33 31	3544	82 53 7	3549	84 12 37	3555	85 32 1	3580
	Fomalhaut W.	46 42 24	3376	48 5 8	3365	49 28 5	3356	50 51 12	3348
	$\alpha$ Pegasi W.	35 8 50	4301	36 15 42	4214	37 23 55	4137	38 33 21	4069
	Aldebaran E.	50 26 1	2942	48 54 36	2952	47 23 23	2962	45 52 22	2970
	Pollux E.	94 39 2	2977	93 8 21	2986	91 37 51	2995	90 7 32	3004
	Sun E.	134 51 51	3306	133 27 46	3317	132 3 54	3326	130 40 13	3336
26	Fomalhaut W.	57 48 37	3324	59 12 21	3321	60 36 8	3319	61 59 57	3318
	$\alpha$ Pegasi W.	44 34 48	3622	45 49 20	3725	47 4 27	3766	48 20 5	3738
	Aldebaran E.	38 20 1	3012	36 50 3	3019	35 20 14	3026	33 50 33	3032
	Pollux E.	82 38 39	3045	81 9 22	3052	79 40 14	3060	78 11 15	3067
	Sun E.	123 44 25	3379	122 21 44	3386	120 59 12	3393	119 36 48	3400
27	Fomalhaut W.	68 59 30	3312	70 23 28	3310	71 47 28	3309	73 11 20	3308
	$\alpha$ Pegasi W.	54 44 44	3633	56 2 43	3617	57 20 59	3602	58 39 31	3587
	Pollux E.	70 48 15	3094	69 19 58	3099	67 51 47	3104	66 23 42	3108
	Sun E.	112 46 34	3427	111 24 48	3431	110 3 7	3436	108 41 31	3439
28	Fomalhaut W.	80 11 52	3301	81 36 2	3300	83 0 13	3299	84 24 26	3296
	$\alpha$ Pegasi W.	65 15 44	3530	66 35 35	3519	67 55 38	3509	69 15 52	3500
	Pollux E.	59 4 17	3121	57 36 33	3123	56 8 51	3124	54 41 11	3126
	SATURN E.	79 55 48	3116	78 27 58	3116	77 0 8	3116	75 32 18	3115
	Sun E.	101 54 11	3446	100 32 47	3446	99 11 23	3446	97 49 59	3446
29	Fomalhaut W.	91 26 13	3283	92 50 44	3280	94 15 19	3276	95 39 58	3273
	$\alpha$ Pegasi W.	75 59 31	3456	77 20 44	3448	78 42 6	3440	80 3 37	3431
	$\alpha$ Arietis W.	32 30 52	3619	33 49 6	3573	35 8 10	3539	36 27 59	3495
	Pollux E.	47 23 6	3127	45 55 29	3127	44 27 52	3127	43 0 15	3126
	SATURN E.	68 12 39	3103	66 44 33	3099	65 16 22	3095	63 48 6	3091
	Sun E.	91 2 34	3433	89 40 55	3429	88 19 11	3425	86 57 23	3420
30	Fomalhaut W.	102 44 18	3253	104 9 24	3248	105 34 36	3244	106 59 53	3240
	$\alpha$ Arietis W.	43 16 30	3345	44 39 49	3320	46 3 37	3297	47 27 52	3275
	Pollux E.	35 42 4	3127	34 14 27	3129	32 46 52	3130	31 19 19	3133
	SATURN E.	56 25 9	3059	54 56 9	3052	53 27 0	3043	51 57 41	3034
	Sun E.	80 6 44	3386	78 44 12	3379	77 21 31	3371	75 58 41	3362
31	$\alpha$ Arietis W.	54 35 25	3173	56 2 7	3153	57 29 12	3134	58 56 40	3116
	Aldebaran W.	21 21 20	2952	22 52 33	2939	24 24 2	2927	25 55 47	2914
	SATURN E.	44 28 15	2986	42 57 45	2974	41 27 0	2963	39 56 1	2951
	Sun E.	69 1 45	3310	67 37 45	3296	66 13 31	3287	64 49 4	3274

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22	$\alpha$ Arietis E.	51 34 31	2973	50 3 45	2996	48 33 30	3024	47 3 47	3052
	Aldebaran E.	81 44 20	2713	80 7 57	2725	78 31 51	2738	76 56 1	2750
23	$\alpha$ Aquilæ W.	65 34 38	3534	66 54 25	3528	68 14 18	3525	69 34 15	3523
	$\alpha$ Arietis E.	39 44 20	3218	38 18 32	3259	36 53 33	3304	35 29 26	3353
	Aldebaran E.	69 0 50	2810	67 56 35	2821	65 52 35	2834	64 18 51	2845
24	$\alpha$ Aquilæ W.	76 14 13	3525	77 34 9	3529	78 54 1	3533	80 13 49	3538
	Fomalhaut W.	41 14 18	3441	42 35 48	3421	43 57 41	3403	45 19 54	3388
	Aldebaran E.	56 33 51	2901	55 1 34	2912	53 29 30	2922	51 57 39	2932
25	$\alpha$ Aquilæ W.	86 51 19	3567	88 10 29	3576	89 29 30	3584	90 48 22	3591
	Fomalhaut W.	52 14 28	3341	53 37 52	3336	55 1 22	3332	56 24 57	3327
	$\alpha$ Pegasi W.	39 43 53	4010	40 55 23	3957	42 7 45	3910	43 20 55	3867
	Aldebaran E.	44 21 32	2979	42 50 53	2988	41 20 25	2997	39 50 8	3005
	Pollux E.	88 37 24	3013	87 7 27	3022	85 37 41	3030	84 8 5	3038
	Sun E.	129 16 43	3345	127 53 23	3354	126 30 14	3363	125 7 15	3371
26	Fomalhaut W.	63 23 48	3315	64 47 42	3314	66 11 37	3313	67 35 33	3313
	$\alpha$ Pegasi W.	49 36 12	3712	50 52 46	3690	52 9 44	3669	53 27 4	3650
	Aldebaran E.	32 21 0	3039	30 51 35	3045	29 22 18	3051	27 53 8	3056
	Pollux E.	76 42 25	3073	75 13 42	3078	73 45 6	3084	72 16 37	3090
	Sun E.	118 14 32	3407	116 52 23	3413	115 30 21	3418	114 8 25	3423
27	Fomalhaut W.	74 35 31	3307	75 59 34	3306	77 23 38	3305	78 47 44	3303
	$\alpha$ Pegasi W.	59 58 19	3575	61 17 21	3563	62 36 36	3551	63 56 4	3540
	Pollux E.	64 55 42	3111	63 27 46	3114	61 59 53	3117	60 32 4	3119
	Sun E.	107 19 58	3441	105 58 28	3444	104 37 1	3446	103 15 36	3446
28	Fomalhaut W.	85 48 42	3294	87 13 0	3292	88 37 21	3289	90 1 45	3286
	$\alpha$ Pegasi W.	70 36 16	3491	71 56 50	3482	73 17 34	3473	74 38 28	3465
	Pollux E.	53 13 33	3127	51 45 56	3127	50 18 19	3128	48 50 43	3127
	SATURN E.	74 4 27	3114	72 36 34	3112	71 8 39	3110	69 40 41	3106
	Sun E.	96 28 35	3415	95 7 9	3442	93 45 40	3440	92 24 9	3437
29	Fomalhaut W.	97 4 41	3269	98 29 29	3265	99 54 21	3262	101 19 17	3258
	$\alpha$ Pegasi W.	81 25 18	3423	82 47 8	3415	84 9 8	3407	85 31 17	3399
	$\alpha$ Arietis W.	37 48 29	3460	39 9 38	3428	40 31 23	3399	41 53 41	3372
	Pollux E.	41 32 37	3126	40 4 59	3125	38 37 20	3126	37 9 42	3126
	SATURN E.	62 19 45	3085	60 51 17	3079	59 22 42	3073	57 54 0	3066
	Sun E.	85 35 29	3415	84 13 29	3408	82 51 22	3401	81 29 7	3394
30	Fomalhaut W.	108 25 15	3236	109 50 42	3231	111 16 15	3226	112 41 53	3222
	$\alpha$ Arietis W.	48 52 33	3253	50 17 40	3232	51 43 11	3212	53 9 6	3192
	Pollux E.	29 51 50	3138	28 24 27	3146	26 57 13	3155	25 30 10	3168
	SATURN E.	50 28 11	3026	48 58 30	3016	47 28 37	3006	45 58 32	2997
	Sun E.	74 35 41	3352	73 12 30	3342	71 49 7	3332	70 25 32	3321
31	$\alpha$ Arietis W.	60 24 30	3097	61 52 43	3080	63 21 17	3062	64 50 13	3044
	Aldebaran W.	27 27 48	2901	29 0 5	2889	30 32 38	2876	32 5 27	2863
	SATURN E.	38 24 47	2939	36 53 18	2927	35 21 33	2914	33 49 32	2901
	Sun E.	63 24 22	3261	61 59 25	3248	60 34 13	3235	59 8 45	3221

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination	Diff. for 1 Hour.	Semi-diameter.			
Sat.	1	<sup>h</sup> 10 <sup>m</sup> 43 <sup>s</sup> 59.52	9.065	N. 8° 2' 24.4"	-51.68	15' 53.80"	64.38	0 19.28	0.789
SUN.	2	10 47 36.95	9.054	7 40 28.2	55.00	15 54.03	64.34	0 38.35	0.800
Mon.	3	10 51 14.12	9.044	7 18 24.5	55.31	15 54.27	64.30	0 57.68	0.810
Tues.	4	10 54 51.05	9.034	6 56 13.6	-55.60	15 54.50	64.26	1 17.25	0.820
Wed.	5	10 58 27.75	9.025	6 33 55.8	55.86	15 54.74	64.23	1 37.05	0.829
Thur.	6	11 2 4.24	9.016	6 11 31.5	56.14	15 54.98	64.20	1 57.06	0.838
Frid.	7	11 5 40.53	9.008	5 49 1.1	-56.39	15 55.23	64.18	2 17.27	0.846
Sat.	8	11 9 16.63	9.001	5 26 24.8	56.63	15 55.48	64.15	2 37.66	0.853
SUN.	9	11 12 52.56	8.994	5 3 43.1	56.85	15 55.73	64.13	2 58.22	0.860
Mon.	10	11 16 28.35	8.988	4 40 56.2	-57.06	15 55.99	64.11	3 18.93	0.866
Tues.	11	11 20 4.00	8.983	4 18 4.5	57.24	15 56.25	64.10	3 39.77	0.871
Wed.	12	11 23 39.53	8.979	3 55 8.3	57.42	15 56.51	64.08	4 0.73	0.875
Thur.	13	11 27 14.97	8.975	3 32 8.1	-57.58	15 56.77	64.07	4 21.79	0.879
Frid.	14	11 30 50.32	8.972	3 9 4.1	57.73	15 57.03	64.06	4 42.94	0.882
Sat.	15	11 34 25.61	8.970	2 45 56.6	57.87	15 57.30	64.06	5 4.15	0.884
SUN.	16	11 38 0.86	8.969	2 22 46.0	-57.99	15 57.57	64.06	5 25.40	0.885
Mon.	17	11 41 36.09	8.968	1 59 32.8	58.10	15 57.84	64.06	5 46.65	0.886
Tues.	18	11 45 11.34	8.969	1 36 17.0	58.20	15 58.11	64.06	6 7.90	0.885
Wed.	19	11 48 46.61	8.971	1 12 59.1	-58.28	15 58.38	64.07	6 29.12	0.883
Thur.	20	11 52 21.94	8.974	0 49 39.4	58.35	15 58.65	64.08	6 50.29	0.880
Frid.	21	11 55 57.35	8.978	0 26 18.3	58.40	15 58.92	64.09	7 11.37	0.876
Sat.	22	11 59 32.86	8.983	N. 0 2 56.0	-58.44	15 59.19	64.11	7 32.36	0.871
SUN.	23	12 3 8.49	8.989	S. 0 20 27.2	58.47	15 59.46	64.13	7 53.22	0.865
Mon.	24	12 6 44.27	8.996	0 43 51.0	58.49	15 59.73	64.15	8 13.93	0.858
Tues.	25	12 10 20.23	9.003	1 7 14.8	-58.49	16 0.00	64.17	8 34.47	0.851
Wed.	26	12 13 56.39	9.012	1 30 38.6	58.48	16 0.27	64.20	8 54.81	0.842
Thur.	27	12 17 32.76	9.021	1 54 1.9	58.45	16 0.54	64.24	9 14.93	0.833
Frid.	28	12 21 9.38	9.032	2 17 24.5	-58.41	16 0.81	64.27	9 34.81	0.822
Sat.	29	12 24 46.26	9.043	2 40 45.9	58.36	16 1.08	64.31	9 54.42	0.811
SUN.	30	12 28 23.42	9.055	3 4 5.9	58.29	16 1.35	64.35	10 13.76	0.799
Mon.	31	12 32 0.88	9.068	S. 3 27 24.0	-58.21	16 1.62	64.39	10 32.80	0.786

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.18 from the sideral time.

The sign — prefixed to the hourly change of declination indicates that north declinations are decreasing; south declinations, increasing.

AT GREENWICH MEAN NOON.									
Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sideral Time, or Right Ascension of Mean Sun.	
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.				
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>″</sup>	<sup>″</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>
Sat.	1	10 43 59.56	9.067	N. 8 2 24.1	-54.69	0 19.28	0.789	10 44 18.84	
SUN.	2	10 47 37.04	9.056	7 40 27.6	55.01	0 38.35	0.800	10 48 15.39	
Mon.	3	10 51 14.26	9.046	7 18 23.6	55.32	0 57.68	0.810	10 52 11.95	
Tues.	4	10 54 51.24	9.036	6 56 12.4	-55.61	1 17.26	0.820	10 56 8.50	
Wed.	5	10 58 27.99	9.027	6 33 54.3	55.89	1 37.07	0.829	11 0 5.06	
Thur.	6	11 2 4.53	9.018	6 11 29.7	56.15	1 57.08	0.838	11 4 1.61	
Frid.	7	11 5 40.87	9.010	5 48 59.0	-56.40	2 17.29	0.846	11 7 58.16	
Sat.	8	11 9 17.02	9.003	5 26 22.4	56.64	2 37.69	0.853	11 11 54.71	
SUN.	9	11 12 53.01	8.996	5 3 40.3	56.86	2 58.26	0.860	11 15 51.27	
Mon.	10	11 16 28.85	8.990	4 40 53.0	-57.07	3 18.97	0.866	11 19 47.82	
Tues.	11	11 20 4.55	8.985	4 18 1.0	57.26	3 39.82	0.871	11 23 44.37	
Wed.	12	11 23 40.13	8.981	3 55 4.5	57.44	4 0.79	0.875	11 27 40.92	
Thur.	13	11 27 15.62	8.977	3 32 3.9	-57.60	4 21.85	0.879	11 31 37.47	
Frid.	14	11 30 51.02	8.974	3 8 59.5	57.75	4 43.00	0.882	11 35 34.02	
Sat.	15	11 34 26.36	8.972	2 45 51.7	57.89	5 4.22	0.884	11 39 30.58	
SUN.	16	11 38 1.67	8.971	2 22 40.8	-58.01	5 25.47	0.885	11 43 27.13	
Mon.	17	11 41 36.95	8.970	1 59 27.2	58.12	5 46.73	0.886	11 47 23.69	
Tues.	18	11 45 12.25	8.971	1 36 11.1	58.22	6 7.99	0.885	11 51 20.24	
Wed.	19	11 48 47.58	8.973	1 12 52.8	-58.30	6 29.21	0.883	11 55 16.79	
Thur.	20	11 52 22.96	8.976	0 49 32.8	58.37	6 50.38	0.880	11 59 13.34	
Frid.	21	11 55 58.42	8.980	0 26 11.3	58.42	7 11.47	0.876	12 3 9.89	
Sat.	22	11 59 33.98	8.985	N. 0 2 48.6	-58.46	7 32.46	0.871	12 7 6.44	
SUN.	23	12 3 9.67	8.991	S. 0 20 34.9	58.49	7 53.33	0.865	12 11 3.00	
Mon.	24	12 6 45.51	8.998	0 43 59.0	58.51	8 14.04	0.858	12 14 59.55	
Tues.	25	12 10 21.52	9.005	1 7 23.2	-58.51	8 34.59	0.851	12 18 56.11	
Wed.	26	12 13 57.73	9.014	1 30 47.3	58.50	8 54.93	0.842	12 22 52.66	
Thur.	27	12 17 34.16	9.023	1 54 11.0	58.47	9 15.05	0.833	12 26 49.21	
Frid.	28	12 21 10.83	9.034	2 17 33.9	-58.43	9 34.93	0.822	12 30 45.76	
Sat.	29	12 24 47.76	9.045	2 40 55.6	58.38	9 54.55	0.811	12 34 42.31	
SUN.	30	12 28 24.97	9.057	3 4 15.9	58.31	10 13.89	0.799	12 38 38.86	
Mon.	31	12 32 2.48	9.070	S. 3 27 34.3	-58.22	10 32.93	0.786	12 42 35.42	
NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon. The sign — prefixed to the hourly change of declination indicates that north declinations are decreasing; south declinations, increasing.								Diff. for 1 hour, + 9 <sup>s</sup> .8565. (Table III.)	



AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	245	159° 25' 51.2	25° 32.2	145.35	— 0.18	0.0037192	—43.2	<sup>h</sup> 13 <sup>m</sup> 13 <sup>s</sup> 30.80
2	246	160 24 0.6	23 41.5	145.43	— 0.05	0.0036148	43.8	13 9 34.89
3	247	161 22 11.8	21 52.6	145.51	+ 0.09	0.0035088	44.5	13 5 38.98
4	248	162 20 24.9	20 5.6	145.59	+ 0.22	0.0034012	—45.2	13 1 43.08
5	249	163 18 39.9	18 20.5	145.66	0.34	0.0032919	45.9	12 57 47.17
6	250	164 16 56.7	16 37.2	145.74	0.42	0.0031810	46.5	12 53 51.26
7	251	165 15 15.3	14 55.7	145.81	+ 0.49	0.0030685	—47.2	12 49 55.35
8	252	166 13 35.6	13 15.9	145.88	0.52	0.0029545	47.8	12 45 59.45
9	253	167 11 57.6	11 37.8	145.95	0.54	0.0028391	48.4	12 42 3.54
10	254	168 10 21.2	10 1.3	146.02	+ 0.51	0.0027224	—48.9	12 38 7.63
11	255	169 8 46.5	8 26.5	146.09	0.46	0.0026046	49.4	12 34 11.73
12	256	170 7 13.4	6 53.4	146.16	0.38	0.0024857	49.8	12 30 15.83
13	257	171 5 41.9	5 21.9	146.22	+ 0.28	0.0023658	—50.1	12 26 19.92
14	258	172 4 11.9	3 51.8	146.29	0.16	0.0022451	50.4	12 22 24.01
15	259	173 2 43.6	2 23.3	146.35	+ 0.04	0.0021238	50.6	12 18 28.10
16	260	174 1 17.0	0 56.6	146.42	— 0.09	0.0020023	—50.7	12 14 32.20
17	261	174 59 52.1	59 31.6	146.50	0.22	0.0018805	50.8	12 10 36.29
18	262	175 58 29.0	58 8.4	146.57	0.34	0.0017584	50.8	12 6 40.38
19	263	176 57 7.7	56 47.0	146.65	— 0.44	0.0016364	—50.8	12 2 44.48
20	264	177 55 48.2	55 27.4	146.73	0.52	0.0015145	50.8	11 58 48.58
21	265	178 54 30.7	54 9.8	146.81	0.57	0.0013926	50.8	11 54 52.67
22	266	179 53 15.2	52 54.3	146.90	— 0.59	0.0012708	—50.8	11 50 56.76
23	267	180 52 1.9	51 40.9	146.99	0.58	0.0011491	50.7	11 47 0.85
24	268	181 50 50.7	50 29.6	147.08	0.54	0.0010275	50.7	11 43 4.95
25	269	182 49 41.7	49 20.5	147.17	— 0.48	0.0009059	—50.7	11 39 9.04
26	270	183 48 34.9	48 13.6	147.26	0.38	0.0007844	50.7	11 35 13.13
27	271	184 47 30.4	47 9.0	147.36	0.27	0.0006628	50.7	11 31 17.23
28	272	185 46 28.3	46 6.8	147.46	— 0.14	0.0005410	—50.9	11 27 21.33
29	273	186 45 28.6	45 7.0	147.56	0.00	0.0004188	51.0	11 23 25.42
30	274	187 44 31.2	44 9.5	147.66	+ 0.14	0.0002962	51.2	11 19 29.51
31	275	188 43 36.0	43 14.2	147.75	+ 0.27	0.0001732	—51.4	11 15 33.60
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>th</sup> .								
								Diff. for 1 Hour, — 9 <sup>h</sup> 8 <sup>m</sup> 26 <sup>s</sup> . (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
1	15' 9.8	15' 15.2	55' 32.3	+1.56	55' 51.9	+1.70	<sup>h</sup> 20 <sup>m</sup> 49.5	<sup>m</sup> 2.18	<sup>d</sup> 24.7
2	15 20.9	15 26.9	56 13.0	1.80	56 35.1	1.87	21 42.0	2.20	25.7
3	15 33.1	15 39.4	56 57.8	1.91	57 20.8	1.91	22 34.8	2.19	26.7
4	15 45.6	15 51.6	57 43.5	+1.87	58 5.5	+1.79	23 27.2	2.17	27.7
5	15 57.2	16 2.5	58 26.4	1.68	58 45.7	1.53	0 6		28.7
6	16 7.2	16 11.3	59 3.0	1.35	59 18.0	1.14	0 19.1	2.15	0.3
7	16 14.6	16 17.3	59 30.3	+0.91	59 39.9	+0.68	1 10.7	2.15	1.3
8	16 19.1	16 20.2	59 46.7	+0.45	59 50.6	+0.21	2 2.4	2.17	2.3
9	16 20.5	16 20.1	59 51.7	-0.02	59 50.2	-0.22	2 54.8	2.21	3.3
10	16 19.0	16 17.4	59 46.4	-0.40	59 40.5	-0.57	3 48.5	2.27	4.3
11	16 15.3	16 12.7	59 32.7	0.71	59 23.3	0.83	4 43.7	2.34	5.3
12	16 9.9	16 6.7	59 12.7	0.93	59 1.0	1.01	5 40.5	2.39	6.3
13	16 3.3	15 59.7	58 48.5	-1.07	58 35.4	-1.11	6 38.1	2.41	7.3
14	15 56.0	15 52.2	58 21.8	1.15	58 7.8	1.18	7 35.5	2.37	8.3
15	15 48.3	15 44.3	57 53.5	1.20	57 39.0	1.22	8 31.5	2.29	9.3
16	15 40.3	15 36.3	57 24.3	-1.23	57 9.4	-1.24	9 25.2	2.18	10.3
17	15 32.2	15 28.1	56 54.5	1.25	56 39.5	1.25	10 16.1	2.06	11.3
18	15 24.1	15 20.0	56 24.6	1.24	56 9.7	1.24	11 4.3	1.95	12.3
19	15 16.0	15 12.1	55 54.9	-1.22	55 40.5	-1.18	11 50.1	1.87	13.3
20	15 8.3	15 4.6	55 26.5	1.14	55 13.0	1.09	12 34.2	1.81	14.3
21	15 1.1	14 57.9	55 0.3	1.02	54 46.5	0.94	13 17.3	1.78	15.3
22	14 55.0	14 52.5	54 37.8	-0.84	54 28.4	-0.73	14 0.1	1.79	16.3
23	14 50.3	14 48.6	54 20.4	0.60	54 14.1	0.45	14 43.2	1.81	17.3
24	14 47.4	14 46.7	54 9.7	-0.28	54 7.3	-0.11	15 27.3	1.86	18.3
25	14 46.7	14 47.2	54 7.1	+0.08	54 9.1	+0.27	16 12.8	1.93	19.3
26	14 48.4	14 50.3	54 13.5	0.48	54 20.5	0.69	16 59.8	2.00	20.3
27	14 52.9	14 56.2	54 30.0	0.90	54 42.0	1.11	17 48.6	2.07	21.3
28	15 0.1	15 4.7	54 56.5	+1.31	55 13.5	+1.51	18 38.8	2.12	22.3
29	15 10.0	15 15.8	55 32.7	1.70	55 54.2	1.87	19 30.1	2.15	23.3
30	15 22.2	15 28.9	56 17.5	2.01	56 42.4	2.13	20 21.8	2.16	24.3
31	15 36.0	15 43.3	57 8.5	+2.21	57 35.3	+2.25	21 13.8	2.16	25.3

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 1.					MONDAY 3.				
0	6 50 22.21	2.2367	N.21 19' 15.0"	- 0.030	0	8 39 4.41	2.2857	N.19 7' 12.8"	5.493
1	6 52 35.88	2.2390	21 19 9.9	0.140	1	8 41 21.56	2.2859	19 1 39.8	5.606
2	6 54 49.69	2.2312	21 18 58.2	0.251	2	8 43 38.72	2.2860	18 56 0.1	5.719
3	6 57 3.63	2.2333	21 18 39.8	0.362	3	8 45 55.88	2.2860	18 50 13.6	5.831
4	6 59 17.69	2.2354	21 18 14.8	0.473	4	8 48 13.04	2.2861	18 44 20.4	5.942
5	7 1 31.88	2.2376	21 17 43.1	0.584	5	8 50 30.21	2.2862	18 38 20.5	6.053
6	7 3 46.20	2.2397	21 17 4.7	0.696	6	8 52 47.38	2.2861	18 32 14.0	6.163
7	7 6 0.64	2.2416	21 16 19.6	0.808	7	8 55 4.54	2.2860	18 26 0.9	6.274
8	7 8 15.19	2.2435	21 15 27.7	0.921	8	8 57 21.70	2.2860	18 19 41.1	6.385
9	7 10 29.86	2.2454	21 14 29.1	1.033	9	8 59 38.86	2.2859	18 13 14.7	6.495
10	7 12 44.64	2.2472	21 13 23.7	1.146	10	9 1 56.01	2.2857	18 6 41.7	6.604
11	7 14 59.53	2.2491	21 12 11.6	1.259	11	9 4 13.15	2.2855	18 0 2.2	6.712
12	7 17 14.53	2.2509	21 10 52.7	1.372	12	9 6 30.27	2.2852	17 53 16.2	6.821
13	7 19 29.64	2.2526	21 9 27.0	1.486	13	9 8 47.38	2.2850	17 46 23.7	6.929
14	7 21 44.85	2.2543	21 7 54.4	1.600	14	9 11 4.47	2.2847	17 39 24.7	7.036
15	7 24 0.16	2.2560	21 6 15.0	1.713	15	9 13 21.54	2.2843	17 32 19.3	7.143
16	7 26 15.57	2.2576	21 4 28.8	1.827	16	9 15 38.59	2.2840	17 25 7.5	7.250
17	7 28 31.07	2.2593	21 2 35.7	1.942	17	9 17 55.62	2.2837	17 17 49.3	7.356
18	7 30 46.67	2.2607	21 0 35.8	2.056	18	9 20 12.63	2.2833	17 10 24.8	7.461
19	7 33 2.36	2.2622	20 58 29.0	2.171	19	9 22 29.61	2.2828	17 2 51.0	7.566
20	7 35 18.13	2.2636	20 56 15.3	2.286	20	9 24 46.56	2.2823	16 55 16.9	7.671
21	7 37 33.99	2.2650	20 53 54.7	2.401	21	9 27 3.49	2.2819	16 47 33.5	7.775
22	7 39 49.93	2.2663	20 51 27.2	2.515	22	9 29 20.39	2.2814	16 39 43.9	7.878
23	7 42 5.95	2.2676	N.20 48 52.9	2.629	23	9 31 37.26	2.2808	N.16 31 48.2	7.980
SUNDAY 2.					TUESDAY 4.				
0	7 44 22.05	2.2689	N.20 46 11.7	2.744	0	9 33 54.09	2.2803	N.16 23 46.3	8.082
1	7 46 38.22	2.2701	20 43 23.6	2.859	1	9 36 10.69	2.2797	16 15 38.3	8.183
2	7 48 54.46	2.2713	20 40 28.6	2.975	2	9 38 27.65	2.2790	16 7 24.3	8.283
3	7 51 10.78	2.2725	20 37 26.6	3.091	3	9 40 44.37	2.2783	15 59 4.3	8.383
4	7 53 27.16	2.2735	20 34 17.7	3.206	4	9 43 1.05	2.2777	15 50 38.3	8.483
5	7 55 43.60	2.2745	20 31 1.9	3.321	5	9 45 17.70	2.2771	15 42 6.4	8.582
6	7 58 0.10	2.2755	20 27 39.2	3.436	6	9 47 34.31	2.2764	15 33 28.5	8.680
7	8 0 16.66	2.2764	20 24 9.6	3.551	7	9 49 50.87	2.2757	15 24 44.8	8.777
8	8 2 33.27	2.2773	20 20 33.1	3.667	8	9 52 7.39	2.2750	15 15 55.3	8.873
9	8 4 49.94	2.2781	20 16 49.6	3.782	9	9 54 23.87	2.2743	15 7 0.0	8.969
10	8 7 6.65	2.2789	20 12 59.2	3.897	10	9 56 40.31	2.2736	14 57 59.0	9.063
11	8 9 23.11	2.2797	20 9 2.0	4.012	11	9 58 56.70	2.2728	14 48 52.4	9.157
12	8 11 40.22	2.2805	20 4 57.8	4.127	12	10 1 13.04	2.2719	14 39 40.1	9.251
13	8 13 57.07	2.2812	20 0 46.7	4.242	13	10 3 29.33	2.2711	14 30 22.3	9.343
14	8 16 13.96	2.2818	19 56 28.8	4.356	14	10 5 45.58	2.2704	14 20 59.0	9.434
15	8 18 30.88	2.2823	19 52 4.0	4.471	15	10 8 1.78	2.2696	14 11 30.2	9.526
16	8 20 47.81	2.2829	19 47 32.3	4.585	16	10 10 17.93	2.2688	14 1 55.9	9.617
17	8 23 4.83	2.2834	19 42 53.8	4.699	17	10 12 34.03	2.2680	13 52 16.2	9.706
18	8 25 21.84	2.2838	19 38 8.4	4.813	18	10 14 50.09	2.2672	13 42 31.2	9.793
19	8 27 38.88	2.2843	19 33 16.2	4.928	19	10 17 6.09	2.2663	13 32 41.0	9.880
20	8 29 55.95	2.2847	19 28 17.1	5.042	20	10 19 22.04	2.2654	13 22 45.6	9.967
21	8 32 13.04	2.2850	19 23 11.2	5.155	21	10 21 37.94	2.2646	13 12 45.0	10.053
22	8 34 30.15	2.2852	19 17 58.5	5.268	22	10 23 53.79	2.2638	13 2 39.3	10.138
23	8 36 47.27	2.2855	19 12 39.0	5.381	23	10 26 9.60	2.2631	12 52 28.5	10.222
24	8 39 4.41	2.2857	N.19 7 12.8	5.493	24	10 28 25.36	2.2622	N.12 42 12.7	10.304



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 5.					FRIDAY 7.				
0	<sup>h</sup> 10 <sup>m</sup> 28 <sup>s</sup> 25.36	2.2632	N. 12° 42' 12.7"	10.304	0	<sup>h</sup> 12 <sup>m</sup> 16 <sup>s</sup> 13.67	2.2376	N. 3° 13' 0.0"	12.951
1	10 30 41.06	2.2613	12 31 52.0	10.385	1	12 18 27.93	2.2377	3 0 2.2	12.975
2	10 32 56.71	2.2604	12 21 26.5	10.466	2	12 20 42.19	2.2378	2 47 3.0	12.997
3	10 35 12.31	2.2596	12 10 56.1	10.547	3	12 22 56.46	2.2380	2 34 2.5	13.019
4	10 37 27.86	2.2587	12 0 20.9	10.626	4	12 25 10.75	2.2382	2 21 0.7	13.039
5	10 39 43.36	2.2579	11 49 41.0	10.703	5	12 27 25.05	2.2384	2 7 57.8	13.057
6	10 41 58.81	2.2571	11 38 56.5	10.779	6	12 29 39.36	2.2387	1 54 53.8	13.074
7	10 44 14.21	2.2562	11 28 7.5	10.854	7	12 31 53.69	2.2391	1 41 48.9	13.090
8	10 46 29.56	2.2554	11 17 14.0	10.929	8	12 34 8.05	2.2395	1 28 43.0	13.105
9	10 48 44.86	2.2546	11 6 16.0	11.003	9	12 36 22.43	2.2399	1 15 36.3	13.118
10	10 51 0.11	2.2538	10 55 13.6	11.077	10	12 38 36.84	2.2404	1 2 28.9	13.129
11	10 53 15.32	2.2531	10 44 6.8	11.148	11	12 40 51.28	2.2408	0 49 20.8	13.140
12	10 55 30.48	2.2523	10 32 55.8	11.218	12	12 43 5.74	2.2413	0 36 12.1	13.148
13	10 57 45.59	2.2515	10 21 40.6	11.287	13	12 45 20.24	2.2419	0 23 3.0	13.155
14	11 0 0.66	2.2507	10 10 21.3	11.356	14	12 47 34.77	2.2425	N. 0 9 53.5	13.162
15	11 2 15.68	2.2500	9 58 57.9	11.423	15	12 49 49.34	2.2432	S. 0 3 16.4	13.167
16	11 4 30.66	2.2492	9 47 30.5	11.489	16	12 52 3.95	2.2439	0 16 26.5	13.169
17	11 6 45.59	2.2485	9 35 59.2	11.553	17	12 54 18.60	2.2446	0 29 36.7	13.171
18	11 9 0.48	2.2478	9 24 24.1	11.617	18	12 56 33.30	2.2454	0 42 47.0	13.172
19	11 11 15.32	2.2471	9 12 45.2	11.679	19	12 58 48.05	2.2461	0 55 57.3	13.170
20	11 13 30.13	2.2465	9 1 2.6	11.741	20	13 1 2.84	2.2469	1 9 7.4	13.167
21	11 15 44.90	2.2458	8 49 16.3	11.801	21	13 3 17.68	2.2478	1 22 17.3	13.163
22	11 17 59.63	2.2452	8 37 26.5	11.860	22	13 5 32.58	2.2488	1 35 27.0	13.158
23	11 20 14.32	2.2446	N. 8 25 33.1	11.918	23	13 7 47.54	2.2497	S. 1 48 36.3	13.151
THURSDAY 6.					SATURDAY 8.				
0	11 22 28.98	2.2440	N. 8 13 36.3	11.975	0	13 10 2.55	2.2507	S. 2 1 45.1	13.142
1	11 24 43.60	2.2434	8 1 36.1	12.030	1	13 12 17.62	2.2518	2 14 53.4	13.133
2	11 26 58.19	2.2428	7 49 32.7	12.084	2	13 14 32.76	2.2529	2 28 1.1	13.122
3	11 29 12.74	2.2423	7 37 26.1	12.137	3	13 16 47.97	2.2540	2 41 8.0	13.108
4	11 31 27.26	2.2418	7 25 16.3	12.188	4	13 19 3.24	2.2551	2 54 14.1	13.094
5	11 33 41.76	2.2414	7 13 3.5	12.238	5	13 21 18.58	2.2563	3 7 19.3	13.079
6	11 35 56.23	2.2409	7 0 47.7	12.288	6	13 23 34.00	2.2576	3 20 23.6	13.062
7	11 38 10.67	2.2404	6 48 29.0	12.336	7	13 25 49.49	2.2588	3 33 26.8	13.044
8	11 40 25.08	2.2400	6 36 7.4	12.382	8	13 28 5.06	2.2601	3 46 28.9	13.024
9	11 42 39.47	2.2397	6 23 43.1	12.427	9	13 30 20.70	2.2614	3 59 29.7	13.002
10	11 44 53.84	2.2393	6 11 16.1	12.472	10	13 32 36.43	2.2628	4 12 29.2	12.980
11	11 47 8.19	2.2390	5 58 46.5	12.515	11	13 34 52.24	2.2642	4 25 27.3	12.957
12	11 49 22.52	2.2387	5 46 14.3	12.557	12	13 37 8.14	2.2657	4 38 24.0	12.932
13	11 51 36.83	2.2384	5 33 39.7	12.597	13	13 39 24.13	2.2672	4 51 19.1	12.904
14	11 53 51.13	2.2382	5 21 2.7	12.636	14	13 41 40.21	2.2687	5 4 12.5	12.875
15	11 56 5.41	2.2379	5 8 23.4	12.673	15	13 43 56.38	2.2703	5 17 4.1	12.845
16	11 58 19.68	2.2378	4 55 41.9	12.709	16	13 46 12.65	2.2710	5 29 53.9	12.814
17	12 0 33.94	2.2377	4 42 58.3	12.743	17	13 48 29.02	2.2736	5 42 41.8	12.782
18	12 2 48.20	2.2376	4 30 12.7	12.777	18	13 50 45.48	2.2753	5 55 27.7	12.747
19	12 5 2.45	2.2374	4 17 25.1	12.810	19	13 53 2.05	2.2770	6 8 11.5	12.712
20	12 7 16.69	2.2373	4 4 35.5	12.842	20	13 55 18.72	2.2788	6 20 53.2	12.676
21	12 9 30.93	2.2373	3 51 44.1	12.871	21	13 57 35.50	2.2806	6 33 32.6	12.637
22	12 11 45.17	2.2374	3 38 51.0	12.898	22	13 59 52.39	2.2824	6 46 9.7	12.597
23	12 13 59.42	2.2375	3 25 56.3	12.925	23	14 2 9.39	2.2843	6 58 44.3	12.556
24	12 16 13.67	2.2376	N. 3 13 0.0	12.951	24	14 4 26.50	2.2862	N. 7 11 16.4	12.513

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 9.					TUESDAY 11.				
0	h m s	<sup>a</sup>	S. ° ' "	"	0	h m s	<sup>a</sup>	S. ° ' "	"
1	14 4 26.50	2.2862	7 11 16.4	12.513	1	15 56 49.11	2.4012	15 57 21.3	8.921
2	14 6 43.73	2.2881	7 23 45.9	12.470	2	15 59 13.26	2.4037	16 6 13.5	8.817
3	14 9 1.07	2.2900	7 36 12.8	12.425	3	16 1 37.55	2.4061	16 14 59.4	8.711
4	14 11 18.53	2.2920	7 48 36.9	12.377	4	16 4 1.99	2.4086	16 23 38.9	8.604
5	14 13 36.11	2.2940	8 0 58.1	12.329	5	16 6 26.58	2.4110	16 32 11.9	8.497
6	14 15 53.81	2.2961	8 13 16.4	12.280	6	16 8 51.31	2.4133	16 40 38.5	8.389
7	14 18 11.64	2.2983	8 25 31.7	12.229	7	16 11 16.18	2.4157	16 48 58.6	8.280
8	14 20 29.59	2.3003	8 37 43.9	12.177	8	16 13 41.20	2.4181	16 57 12.1	8.170
9	14 22 47.67	2.3024	8 49 52.9	12.122	9	16 16 6.36	2.4204	17 5 19.0	8.059
10	14 25 5.88	2.3046	9 1 58.6	12.067	10	16 18 31.65	2.4227	17 13 19.2	7.947
11	14 27 24.22	2.3068	9 14 1.0	12.012	11	16 20 57.08	2.4250	17 21 12.6	7.834
12	14 29 42.69	2.3090	9 26 0.0	11.954	12	16 23 22.65	2.4273	17 28 59.3	7.721
13	14 32 1.30	2.3112	9 37 55.5	11.895	13	16 25 48.36	2.4296	17 36 39.1	7.606
14	14 34 20.04	2.3135	9 49 47.4	11.834	14	16 28 11.20	2.4317	17 44 12.0	7.490
15	14 36 38.92	2.3158	10 1 35.6	11.772	15	16 30 40.16	2.4338	17 51 37.9	7.374
16	14 38 57.94	2.3182	10 13 20.1	11.709	16	16 33 6.25	2.4359	17 58 56.8	7.257
17	14 41 17.10	2.3205	10 25 0.7	11.644	17	16 35 32.47	2.4380	18 6 8.7	7.139
18	14 43 36.40	2.3228	10 36 37.4	11.579	18	16 37 58.81	2.4401	18 13 13.5	7.020
19	14 45 55.84	2.3252	10 48 10.2	11.512	19	16 40 25.28	2.4421	18 20 11.1	6.900
20	14 48 15.43	2.3276	10 59 38.9	11.443	20	16 42 51.86	2.4440	18 27 1.5	6.779
21	14 50 35.16	2.3300	11 11 3.4	11.373	21	16 45 18.56	2.4459	18 33 44.6	6.658
22	14 52 55.03	2.3324	11 22 23.7	11.302	22	16 47 45.37	2.4478	18 40 20.5	6.537
23	14 55 15.05	2.3349	11 33 39.7	11.231	23	16 50 12.29	2.4496	18 46 49.0	6.414
24	14 57 35.22	2.3374	S. 11 44 51.4	11.157	24	16 52 39.32	2.4514	S. 18 53 10.1	6.290
MONDAY 10.					WEDNESDAY 12.				
0	h m s	<sup>a</sup>	S. ° ' "	"	0	h m s	<sup>a</sup>	S. ° ' "	"
1	14 59 55.54	2.3399	S. 11 55 58.6	11.089	1	16 55 6.46	2.4532	S. 18 59 23.8	6.166
2	15 2 16.01	2.3424	12 7 1.2	11.005	2	16 57 33.70	2.4548	19 5 30.0	6.041
3	15 4 36.63	2.3449	12 17 59.2	10.928	3	17 0 1.04	2.4564	19 11 28.7	5.916
4	15 6 57.40	2.3474	12 28 52.6	10.850	4	17 2 28.47	2.4580	19 17 19.9	5.790
5	15 9 18.32	2.3499	12 39 41.2	10.770	5	17 4 56.00	2.4596	19 23 3.5	5.663
6	15 11 39.39	2.3525	12 50 25.0	10.688	6	17 7 23.62	2.4610	19 28 38.5	5.536
7	15 14 0.62	2.3551	13 1 3.8	10.605	7	17 9 51.32	2.4623	19 34 7.8	5.408
8	15 16 22.00	2.3577	13 11 37.6	10.522	8	17 12 19.10	2.4637	19 39 28.4	5.279
9	15 18 43.54	2.3602	13 22 6.4	10.437	9	17 14 46.96	2.4650	19 44 41.3	5.150
10	15 21 5.23	2.3628	13 32 30.1	10.352	10	17 17 14.90	2.4663	19 49 46.4	5.020
11	15 23 27.08	2.3654	13 42 48.6	10.264	11	17 19 42.92	2.4676	19 54 43.7	4.890
12	15 25 49.08	2.3679	13 53 1.8	10.175	12	17 22 11.01	2.4687	19 59 33.2	4.760
13	15 28 11.23	2.3705	14 3 9.6	10.085	13	17 24 39.16	2.4697	20 4 14.9	4.629
14	15 30 33.54	2.3731	14 13 12.0	9.994	14	17 27 7.37	2.4707	20 8 48.7	4.497
15	15 32 56.00	2.3757	14 23 8.9	9.902	15	17 29 35.64	2.4716	20 13 14.6	4.365
16	15 35 18.62	2.3783	14 33 0.3	9.809	16	17 32 3.96	2.4725	20 17 32.5	4.232
17	15 37 41.40	2.3809	14 42 46.0	9.715	17	17 34 32.34	2.4733	20 21 42.5	4.100
18	15 40 4.33	2.3834	14 52 26.1	9.620	18	17 37 0.76	2.4740	20 25 44.5	3.967
19	15 42 27.41	2.3860	15 2 0.4	9.523	19	17 39 29.22	2.4747	20 29 38.6	3.834
20	15 44 50.65	2.3886	15 11 28.9	9.426	20	17 41 57.72	2.4753	20 33 24.6	3.699
21	15 47 14.04	2.3911	15 20 51.5	9.327	21	17 44 26.25	2.4758	20 37 2.5	3.565
22	15 49 37.58	2.3936	15 30 8.1	9.226	22	17 46 54.82	2.4763	20 40 32.4	3.431
23	15 52 1.27	2.3961	15 39 18.6	9.124	23	17 49 23.41	2.4767	20 43 54.2	3.296
24	15 54 25.11	2.3987	15 48 23.0	9.023	24	17 51 52.02	2.4770	20 47 7.9	3.162
	15 56 49.11	2.4012	S. 15 57 21.3	8.921		17 54 20.65	2.4772	S. 20 50 13.6	3.027

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 13.					SATURDAY 15.				
0	h m s	s	S. 20° 50' 13.6"	3.027	0	h m s	s	S. 20° 40' 8.2"	3.343
1	17 54 20.65	2.4772	20 53 11.1	2.891	1	19 54 29.48	2.3974	20 36 43.9	3.466
2	17 59 17.94	2.4775	20 56 0.5	2.755	2	19 56 53.22	2.3941	20 33 12.3	3.587
3	18 1 46.59	2.4775	20 58 41.7	2.619	3	19 59 16.77	2.3907	20 29 33.4	3.708
4	18 4 15.24	2.4774	21 1 14.8	2.483	4	20 1 40.11	2.3872	20 25 47.3	3.828
5	18 6 43.88	2.4773	21 3 39.7	2.347	5	20 4 3.24	2.3837	20 21 54.0	3.947
6	18 9 12.52	2.4771	21 5 56.4	2.210	6	20 6 26.16	2.3802	20 17 53.6	4.066
7	18 11 41.11	2.4768	21 8 4.9	2.074	7	20 8 48.86	2.3766	20 13 46.1	4.184
8	18 14 9.74	2.4765	21 10 5.3	1.938	8	20 11 11.35	2.3730	20 9 31.5	4.309
9	18 16 38.32	2.4761	21 11 57.5	1.802	9	20 13 33.62	2.3693	20 5 9.9	4.418
10	18 19 6.87	2.4755	21 13 41.5	1.666	10	20 15 55.67	2.3656	20 0 41.3	4.533
11	18 21 35.38	2.4748	21 15 17.4	1.529	11	20 18 17.49	2.3618	19 56 5.9	4.618
12	18 24 3.85	2.4742	21 16 45.0	1.392	12	20 20 39.08	2.3579	19 51 23.6	4.762
13	18 26 32.28	2.4735	21 18 4.4	1.256	13	20 23 0.44	2.3541	19 46 34.5	4.875
14	18 29 0.67	2.4727	21 19 15.7	1.120	14	20 25 21.57	2.3502	19 41 38.6	4.967
15	18 31 29.01	2.4718	21 20 18.8	0.983	15	20 27 42.46	2.3462	19 36 36.0	5.098
16	18 33 57.29	2.4708	21 21 13.7	0.847	16	20 30 3.12	2.3422	19 31 26.8	5.209
17	18 36 25.51	2.4697	21 22 0.4	0.711	17	20 32 23.53	2.3382	19 26 10.9	5.319
18	18 38 53.66	2.4686	21 22 39.0	0.575	18	20 34 43.70	2.3341	19 20 48.5	5.427
19	18 41 21.74	2.4674	21 23 9.4	0.439	19	20 37 3.62	2.3300	19 15 19.6	5.535
20	18 43 49.75	2.4662	21 23 31.7	0.304	20	20 39 23.30	2.3260	19 9 44.3	5.643
21	18 46 17.68	2.4648	21 23 45.9	0.169	21	20 41 42.74	2.3219	19 4 2.5	5.749
22	18 48 45.52	2.4633	21 23 52.0	- 0.033	22	20 44 1.93	2.3177	18 58 14.4	5.853
23	18 51 13.28	2.4619	S. 21° 23' 49.9"	+ 0.109	23	20 46 20.86	2.3134	S. 18° 52' 20.1"	5.957
FRIDAY 14.					SUNDAY 16.				
0	h m s	s	S. 21° 23' 30.7"	0.237	0	h m s	s	S. 18° 46' 19.6"	6.060
1	18 56 8.52	2.4586	21 23 21.5	0.371	1	20 50 57.97	2.3050	18 40 12.9	6.169
2	18 58 35.98	2.4569	21 22 55.2	0.505	2	20 53 16.14	2.3007	18 34 0.1	6.264
3	19 1 3.34	2.4551	21 22 20.9	0.638	3	20 55 34.05	2.2963	18 27 41.2	6.365
4	19 3 30.59	2.4532	21 21 38.6	0.772	4	20 57 51.70	2.2920	18 21 16.3	6.464
5	19 5 57.72	2.4511	21 20 48.3	0.905	5	21 0 9.09	2.2878	18 14 45.5	6.562
6	19 8 24.72	2.4490	21 19 50.0	1.038	6	21 2 26.23	2.2835	18 8 8.8	6.660
7	19 10 51.60	2.4469	21 18 43.8	1.170	7	21 4 43.11	2.2791	18 1 26.3	6.757
8	19 13 18.35	2.4448	21 17 29.6	1.302	8	21 6 53.72	2.2746	17 54 38.0	6.852
9	19 15 44.98	2.4427	21 16 7.5	1.434	9	21 9 16.06	2.2702	17 47 44.1	6.946
10	19 18 11.47	2.4403	21 14 37.5	1.565	10	21 11 32.14	2.2657	17 40 44.5	7.040
11	19 20 37.81	2.4379	21 12 59.7	1.695	11	21 13 47.95	2.2613	17 33 39.3	7.132
12	19 23 4.01	2.4354	21 11 14.1	1.825	12	21 16 3.50	2.2569	17 26 28.6	7.223
13	19 25 30.06	2.4328	21 9 20.7	1.955	13	21 18 18.78	2.2524	17 19 12.5	7.313
14	19 27 55.95	2.4302	21 7 19.5	2.084	14	21 20 33.79	2.2480	17 11 51.0	7.403
15	19 30 21.68	2.4275	21 5 10.6	2.213	15	21 22 48.54	2.2436	17 4 24.1	7.492
16	19 32 47.25	2.4248	21 2 54.0	2.341	16	21 25 3.02	2.2391	16 56 51.9	7.580
17	19 35 12.66	2.4221	21 0 29.7	2.468	17	21 27 17.23	2.2347	16 49 14.5	7.666
18	19 37 37.90	2.4192	20 57 57.8	2.595	18	21 29 31.18	2.2302	16 41 32.0	7.751
19	19 40 2.96	2.4162	20 55 18.3	2.721	19	21 31 44.86	2.2257	16 33 44.4	7.835
20	19 42 27.84	2.4132	20 52 31.3	2.847	20	21 33 58.26	2.2212	16 25 51.8	7.918
21	19 44 52.55	2.4102	20 49 36.7	2.972	21	21 36 11.40	2.2167	16 17 54.2	8.001
22	19 47 17.07	2.4071	20 46 34.6	3.097	22	21 38 24.27	2.2122	16 9 51.7	8.082
23	19 49 41.40	2.4039	20 43 25.1	3.220	23	21 40 36.87	2.2077	16 1 44.4	8.162
24	19 52 5.54	2.4007	S. 20° 40' 8.2"	3.343	24	21 42 49.20	2.2032	S. 15° 53' 32.3"	8.241

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 17.					WEDNESDAY 19.				
0	21 42 49.20	2.2032	S. 15° 53' 32.3"	8.241	0	23 23 44.76	2.0121	S. 8° 6' 38.6"	10.822
1	21 45 1.26	2.1988	15 45 15.5	8.318	1	23 25 45.39	2.0089	7 55 48.4	10.851
2	21 47 13.06	2.1944	15 36 54.1	8.395	2	23 27 45.83	2.0057	7 44 56.5	10.878
3	21 49 24.59	2.1899	15 28 28.1	8.472	3	23 29 46.08	2.0026	7 34 3.0	10.905
4	21 51 35.85	2.1855	15 19 57.5	8.548	4	23 31 46.14	1.9995	7 23 7.9	10.932
5	21 53 46.85	2.1811	15 11 22.4	8.622	5	23 33 46.02	1.9965	7 12 11.2	10.958
6	21 55 57.58	2.1767	15 2 42.9	8.694	6	23 35 45.72	1.9935	7 1 13.0	10.983
7	21 58 8.05	2.1722	14 53 59.1	8.766	7	23 37 45.24	1.9905	6 50 13.3	11.007
8	22 0 18.25	2.1678	14 45 11.0	8.836	8	23 39 44.58	1.9876	6 39 12.2	11.029
9	22 2 28.19	2.1635	14 36 18.8	8.905	9	23 41 43.75	1.9847	6 28 9.8	11.051
10	22 4 37.87	2.1591	14 27 22.4	8.974	10	23 43 42.75	1.9819	6 17 6.1	11.072
11	22 6 47.29	2.1547	14 18 21.9	9.042	11	23 45 41.58	1.9791	6 6 1.2	11.092
12	22 8 56.44	2.1504	14 9 17.3	9.109	12	23 47 40.24	1.9763	5 54 55.1	11.111
13	22 11 5.33	2.1461	14 0 8.8	9.174	13	23 49 38.74	1.9736	5 43 47.9	11.129
14	22 13 13.97	2.1418	13 50 56.4	9.238	14	23 51 37.08	1.9710	5 32 39.6	11.147
15	22 15 22.35	2.1375	13 41 40.2	9.302	15	23 53 35.26	1.9684	5 21 30.3	11.163
16	22 17 30.47	2.1332	13 32 20.2	9.364	16	23 55 33.29	1.9658	5 10 20.0	11.179
17	22 19 38.34	2.1291	13 22 56.5	9.425	17	23 57 31.16	1.9632	4 59 8.8	11.194
18	22 21 45.96	2.1249	13 13 29.2	9.485	18	23 59 28.88	1.9607	4 47 56.7	11.208
19	22 23 53.33	2.1207	13 3 58.3	9.545	19	0 1 26.45	1.9583	4 36 43.8	11.221
20	22 26 0.44	2.1164	12 54 23.8	9.603	20	0 3 23.88	1.9560	4 25 30.2	11.233
21	22 28 7.30	2.1123	12 44 45.9	9.660	21	0 5 21.17	1.9537	4 14 15.9	11.244
22	22 30 13.92	2.1082	12 35 4.6	9.716	22	0 7 18.32	1.9513	4 3 0.9	11.255
23	22 32 20.29	2.1041	S. 12° 25' 20.0"	9.771	23	0 9 15.33	1.9490	S. 3° 51' 45.3"	11.264
TUESDAY 18.					THURSDAY 20.				
0	22 34 26.41	2.1000	S. 12° 15' 32.1"	9.825	0	0 11 12.20	1.9468	S. 3° 40' 29.2"	11.273
1	22 36 32.29	2.0960	12 5 41.0	9.878	1	0 13 8.94	1.9447	3 29 12.6	11.281
2	22 38 37.93	2.0920	11 55 46.7	9.930	2	0 15 5.56	1.9426	3 17 55.5	11.288
3	22 40 43.33	2.0880	11 45 49.4	9.980	3	0 17 2.05	1.9405	3 6 38.0	11.294
4	22 42 48.49	2.0841	11 35 49.1	10.030	4	0 18 58.42	1.9385	2 55 20.2	11.300
5	22 44 53.42	2.0802	11 25 45.8	10.080	5	0 20 54.67	1.9364	2 44 2.0	11.305
6	22 46 58.11	2.0763	11 15 39.5	10.128	6	0 22 50.79	1.9344	2 32 43.6	11.308
7	22 49 2.57	2.0724	11 5 30.4	10.175	7	0 24 46.80	1.9326	2 21 25.0	11.311
8	22 51 6.80	2.0686	10 55 18.5	10.221	8	0 26 42.70	1.9308	2 10 6.2	11.313
9	22 53 10.80	2.0648	10 45 3.9	10.265	9	0 28 38.49	1.9290	1 58 47.4	11.314
10	22 55 14.57	2.0610	10 34 46.7	10.309	10	0 30 34.18	1.9272	1 47 28.5	11.315
11	22 57 18.12	2.0572	10 24 26.8	10.352	11	0 32 29.76	1.9255	1 36 9.6	11.315
12	22 59 21.44	2.0535	10 14 4.4	10.394	12	0 34 25.24	1.9238	1 24 50.7	11.314
13	23 1 24.54	2.0499	10 3 39.5	10.435	13	0 36 20.62	1.9222	1 13 31.9	11.312
14	23 3 27.43	2.0463	9 53 12.2	10.475	14	0 38 15.91	1.9206	1 2 13.2	11.310
15	23 5 30.10	2.0427	9 42 42.5	10.511	15	0 40 11.10	1.9191	0 50 54.7	11.306
16	23 7 32.56	2.0392	9 32 10.5	10.542	16	0 42 6.20	1.9177	0 39 36.5	11.302
17	23 9 34.80	2.0356	9 21 36.3	10.568	17	0 44 1.22	1.9162	0 28 18.5	11.297
18	23 11 36.83	2.0321	9 10 59.9	10.594	18	0 45 56.15	1.9148	0 17 0.8	11.292
19	23 13 38.66	2.0287	9 0 21.4	10.659	19	0 47 51.00	1.9135	S. 0° 5' 43.5"	11.285
20	23 15 40.28	2.0253	8 49 40.8	10.694	20	0 49 45.77	1.9122	N. 0° 5' 33.4"	11.277
21	23 17 41.70	2.0220	8 38 58.1	10.727	21	0 51 40.46	1.9109	0 16 49.8	11.269
22	23 19 42.92	2.0187	8 28 13.5	10.759	22	0 53 35.08	1.9097	0 28 5.7	11.261
23	23 21 43.94	2.0154	8 17 27.0	10.791	23	0 55 29.63	1.9086	0 39 21.1	11.252
24	23 23 44.76	2.0121	S. 8° 6' 38.6"	10.822	24	0 57 24.11	1.9075	N. 0° 50' 35.9"	11.241

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 21.					SUNDAY 23.				
0	0 57 24.11	1.9075	N. 0 50' 35.9"	11.241	0	2 28 31.66	1.9060	N. 9 25' 5.0"	9.940
1	0 59 18.53	1.9064	1 1 50.0	11.230	1	2 30 26.05	1.9070	9 35 0.1	9.897
2	1 1 12.88	1.9053	1 13 3.5	11.219	2	2 32 20.50	1.9080	9 44 52.6	9.853
3	1 3 7.17	1.9044	1 24 16.3	11.207	3	2 34 15.01	1.9091	9 54 42.5	9.810
4	1 5 1.41	1.9035	1 35 28.3	11.193	4	2 36 9.59	1.9102	10 4 29.8	9.766
5	1 6 55.59	1.9026	1 46 39.5	11.179	5	2 38 4.23	1.9113	10 14 14.4	9.721
6	1 8 49.72	1.9017	1 57 49.8	11.164	6	2 39 58.94	1.9124	10 23 56.3	9.675
7	1 10 43.80	1.9009	2 8 59.2	11.149	7	2 41 53.72	1.9136	10 33 35.4	9.628
8	1 12 37.83	1.9002	2 20 7.7	11.133	8	2 43 48.58	1.9149	10 43 11.7	9.581
9	1 14 31.82	1.8995	2 31 15.2	11.116	9	2 45 43.51	1.9162	10 52 45.1	9.533
10	1 16 25.77	1.8988	2 42 21.6	11.099	10	2 47 38.52	1.9175	11 2 15.7	9.485
11	1 18 19.68	1.8982	2 53 27.0	11.081	11	2 49 33.61	1.9188	11 11 43.3	9.436
12	1 20 13.56	1.8976	3 4 31.3	11.062	12	2 51 28.78	1.9202	11 21 8.0	9.387
13	1 22 7.40	1.8971	3 15 34.4	11.042	13	2 53 24.03	1.9216	11 30 29.7	9.337
14	1 24 1.21	1.8967	3 26 36.3	11.023	14	2 55 19.37	1.9231	11 39 48.4	9.287
15	1 25 55.00	1.8962	3 37 37.0	11.001	15	2 57 14.80	1.9246	11 49 4.1	9.236
16	1 27 48.76	1.8958	3 48 36.4	10.979	16	2 59 10.32	1.9261	11 58 16.7	9.184
17	1 29 42.50	1.8955	3 59 34.5	10.957	17	3 1 5.93	1.9277	12 7 26.1	9.131
18	1 31 36.22	1.8952	4 10 31.3	10.935	18	3 3 1.64	1.9293	12 16 32.4	9.078
19	1 33 29.92	1.8949	4 21 26.7	10.911	19	3 4 57.45	1.9309	12 25 35.5	9.024
20	1 35 23.61	1.8947	4 32 20.6	10.886	20	3 6 53.35	1.9325	12 34 35.3	8.970
21	1 37 17.29	1.8946	4 43 13.0	10.861	21	3 8 49.35	1.9342	12 43 31.9	8.916
22	1 39 10.96	1.8944	4 54 3.9	10.835	22	3 10 45.45	1.9359	12 52 25.2	8.861
23	1 41 4.62	1.8943	N. 5 4 53.2	10.809	23	3 12 41.66	1.9377	N. 13 1 15.2	8.805
SATURDAY 22.					MONDAY 24.				
0	1 42 58.28	1.8943	N. 5 15 41.0	10.789	0	3 14 37.97	1.9394	N. 13 10 1.8	8.748
1	1 44 51.94	1.8943	5 26 27.1	10.754	1	3 16 34.39	1.9412	13 18 45.0	8.691
2	1 46 45.60	1.8943	5 37 11.5	10.726	2	3 18 30.92	1.9431	13 27 24.8	8.634
3	1 48 39.26	1.8944	5 47 54.2	10.697	3	3 20 27.56	1.9449	13 36 1.1	8.576
4	1 50 32.93	1.8946	5 58 35.2	10.667	4	3 22 24.31	1.9468	13 44 33.9	8.517
5	1 52 26.61	1.8948	6 9 14.3	10.637	5	3 24 21.18	1.9487	13 53 3.2	8.458
6	1 54 20.31	1.8951	6 19 51.6	10.606	6	3 26 18.16	1.9507	14 1 28.9	8.398
7	1 56 14.02	1.8953	6 30 27.0	10.574	7	3 28 15.26	1.9527	14 9 51.0	8.338
8	1 58 7.75	1.8956	6 41 0.5	10.542	8	3 30 12.48	1.9547	14 18 9.4	8.277
9	2 0 1.49	1.8959	6 51 32.1	10.509	9	3 32 9.82	1.9567	14 26 24.2	8.216
10	2 1 55.25	1.8963	7 2 1.6	10.475	10	3 34 7.29	1.9588	14 34 35.3	8.154
11	2 3 49.04	1.8967	7 12 29.1	10.442	11	3 36 4.88	1.9609	14 42 42.6	8.091
12	2 5 42.86	1.8972	7 22 54.6	10.408	12	3 38 2.60	1.9631	14 50 46.2	8.028
13	2 7 36.71	1.8977	7 33 18.0	10.372	13	3 40 0.45	1.9652	14 58 46.0	7.964
14	2 9 30.59	1.8982	7 43 39.2	10.335	14	3 41 58.42	1.9673	15 6 41.9	7.899
15	2 11 24.50	1.8988	7 53 58.2	10.298	15	3 43 56.52	1.9694	15 14 33.9	7.835
16	2 13 18.45	1.8995	8 4 15.0	10.261	16	3 45 54.75	1.9716	15 22 22.1	7.770
17	2 15 12.44	1.9002	8 14 29.5	10.223	17	3 47 53.12	1.9739	15 30 6.3	7.704
18	2 17 6.47	1.9009	8 24 41.7	10.184	18	3 49 51.62	1.9762	15 37 46.5	7.637
19	2 19 0.55	1.9017	8 34 51.6	10.146	19	3 51 50.26	1.9784	15 45 22.7	7.570
20	2 20 54.67	1.9024	8 44 59.2	10.107	20	3 53 49.03	1.9807	15 52 54.9	7.502
21	2 22 48.84	1.9032	8 55 4.1	10.066	21	3 55 47.94	1.9830	16 0 23.0	7.434
22	2 24 43.06	1.9041	9 5 7.1	10.024	22	3 57 46.99	1.9853	16 7 47.0	7.365
23	2 26 37.33	1.9050	9 15 7.3	9.982	23	3 59 46.18	1.9877	16 15 6.8	7.296
24	2 28 31.66	1.9060	N. 9 25 5.0	9.940	24	4 1 45.52	1.9901	N. 16 22 22.5	7.227



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 25.					THURSDAY 27.				
0	4 1 45.52	1.9901	N.16° 22' 22.5"	7.227	0	5 40 15.39	2.1157	N.20° 38' 32.0"	3.343
1	4 3 45.00	1.9925	16 29 34.0	7.156	1	5 42 22.41	2.1183	20 41 44.1	3.154
2	4 5 44.02	1.9949	16 36 41.2	7.084	2	5 44 29.59	2.1209	20 44 50.4	3.058
3	4 7 44.30	1.9973	16 43 44.1	7.013	3	5 46 36.92	2.1234	20 47 51.0	2.962
4	4 9 44.30	1.9997	16 50 42.8	6.941	4	5 48 44.40	2.1260	20 50 45.8	2.865
5	4 11 44.36	2.0022	16 57 37.1	6.868	5	5 50 52.04	2.1286	20 53 34.8	2.767
6	4 13 44.57	2.0047	17 4 27.0	6.795	6	5 52 59.83	2.1311	20 56 17.9	2.670
7	4 15 44.93	2.0072	17 11 12.5	6.722	7	5 55 7.77	2.1336	20 58 55.2	2.573
8	4 17 45.44	2.0097	17 17 53.6	6.647	8	5 57 15.86	2.1362	21 1 26.6	2.474
9	4 19 46.10	2.0123	17 24 30.2	6.572	9	5 59 24.11	2.1388	21 3 52.1	2.376
10	4 21 46.92	2.0149	17 31 2.3	6.497	10	6 1 32.51	2.1412	21 6 11.7	2.277
11	4 23 47.89	2.0174	17 37 29.8	6.421	11	6 3 41.05	2.1435	21 8 25.3	2.178
12	4 25 49.01	2.0200	17 43 52.8	6.345	12	6 5 49.73	2.1459	21 10 33.0	2.078
13	4 27 50.29	2.0226	17 50 11.2	6.268	13	6 7 58.56	2.1484	21 12 34.7	1.977
14	4 29 51.72	2.0252	17 56 24.9	6.190	14	6 10 7.54	2.1508	21 14 30.3	1.876
15	4 31 53.31	2.0277	18 2 34.0	6.112	15	6 12 16.66	2.1532	21 16 19.8	1.775
16	4 33 55.05	2.0303	18 8 38.4	6.034	16	6 14 25.92	2.1555	21 18 3.3	1.674
17	4 35 56.95	2.0330	18 14 38.1	5.955	17	6 16 35.32	2.1578	21 19 40.7	1.573
18	4 37 59.01	2.0357	18 20 33.0	5.875	18	6 18 44.86	2.1602	21 21 11.9	1.469
19	4 40 1.23	2.0383	18 26 23.1	5.795	19	6 20 54.54	2.1625	21 22 37.0	1.367
20	4 42 3.61	2.0410	18 32 8.4	5.714	20	6 23 4.36	2.1647	21 23 55.9	1.264
21	4 44 6.15	2.0436	18 37 48.8	5.633	21	6 25 14.31	2.1670	21 25 8.7	1.161
22	4 46 8.84	2.0462	18 43 24.4	5.551	22	6 27 24.40	2.1692	21 26 15.2	1.057
23	4 48 11.69	2.0489	N.18 48 55.0	5.469	23	6 29 34.62	2.1714	N.21 27 15.5	0.953
WEDNESDAY 26.					FRIDAY 28.				
0	4 50 14.70	2.0516	N.18 54 20.7	5.387	0	6 31 44.97	2.1736	N.21 28 9.5	0.847
1	4 52 17.87	2.0543	18 59 41.4	5.303	1	6 33 55.45	2.1757	21 28 57.2	0.742
2	4 54 21.21	2.0570	19 4 57.1	5.219	2	6 36 6.06	2.1779	21 29 38.6	0.637
3	4 56 24.71	2.0596	19 10 7.7	5.134	3	6 38 16.80	2.1800	21 30 13.7	0.533
4	4 58 28.37	2.0623	19 15 13.2	5.050	4	6 40 27.66	2.1820	21 30 42.5	0.427
5	5 0 32.19	2.0651	19 20 13.7	4.966	5	6 42 38.64	2.1841	21 31 5.0	0.322
6	5 2 36.18	2.0678	19 25 9.1	4.880	6	6 44 49.75	2.1862	21 31 21.1	0.215
7	5 4 40.33	2.0704	19 29 59.3	4.793	7	6 47 0.98	2.1882	21 31 30.8	+0.108
8	5 6 44.63	2.0731	19 34 44.2	4.705	8	6 49 12.33	2.1901	21 31 34.0	0.000
9	5 8 49.10	2.0758	19 39 23.9	4.617	9	6 51 23.79	2.1920	21 31 30.8	-0.108
10	5 10 53.73	2.0785	19 43 58.3	4.530	10	6 53 35.37	2.1939	21 31 21.1	0.215
11	5 12 58.52	2.0812	19 48 27.5	4.442	11	6 55 47.06	2.1957	21 31 5.0	0.323
12	5 15 3.47	2.0838	19 52 51.4	4.353	12	6 57 58.86	2.1976	21 30 42.4	0.431
13	5 17 8.58	2.0865	19 57 9.0	4.263	13	7 0 10.77	2.1994	21 30 13.3	0.539
14	5 19 13.85	2.0892	20 1 23.0	4.174	14	7 2 22.79	2.2012	21 29 37.7	0.648
15	5 21 19.28	2.0919	20 5 30.8	4.084	15	7 4 34.92	2.2030	21 28 55.6	0.757
16	5 23 24.84	2.0946	20 9 33.1	3.993	16	7 6 47.15	2.2047	21 28 6.9	0.866
17	5 25 30.64	2.0973	20 13 29.9	3.901	17	7 8 59.49	2.2065	21 27 11.7	0.975
18	5 27 36.56	2.1000	20 17 21.2	3.809	18	7 11 11.93	2.2082	21 26 9.9	1.085
19	5 29 42.61	2.1027	20 21 7.0	3.716	19	7 13 24.47	2.2098	21 25 1.5	1.195
20	5 31 48.88	2.1053	20 24 47.2	3.623	20	7 15 37.10	2.2113	21 23 46.5	1.305
21	5 33 55.27	2.1079	20 28 21.8	3.530	21	7 17 49.83	2.2129	21 22 24.9	1.415
22	5 36 1.82	2.1105	20 31 50.8	3.437	22	7 20 2.65	2.2144	21 20 56.7	1.525
23	5 38 8.53	2.1131	20 35 14.2	3.343	23	7 22 15.56	2.2160	21 19 21.9	1.636
24	5 40 15.39	2.1157	N.20 38 32.0	3.249	24	7 24 28.57	2.2175	N.21 17 40.4	1.747

GREENWICH MEAN TIME.																	
THE MOON'S RIGHT ASCENSION AND DECLINATION.																	
Hour.	Right Ascension.			Diff. for 1 Minute.	Declination.			Diff. for 1 Minute.	Hour.	Right Ascension.			Diff. for 1 Minute.	Declination.			Diff. for 1 Minute.
SATURDAY 29.									MONDAY, OCTOBER 1.								
0	h	m	s	2.9175	N.21°	17'	40.4"	1.747	0	h	m	s	2.9595	N.17°	45'	23.7"	7.064
1	7	26	41.66	2.9189	21	15	52.3	1.858									
2	7	28	54.84	2.9203	21	13	57.5	1.969									
3	7	31	8.10	2.9217	21	11	56.0	2.080									
4	7	33	21.44	2.9230	21	9	47.9	2.191									
5	7	35	34.86	2.9243	21	7	33.1	2.302									
6	7	37	48.26	2.9256	21	5	11.6	2.414									
7	7	40	1.94	2.9269	21	2	43.4	2.526									
8	7	42	15.59	2.9281	21	0	8.5	2.637									
9	7	44	29.31	2.9293	20	57	26.9	2.749									
10	7	46	43.11	2.9305	20	54	38.6	2.862									
11	7	48	56.97	2.9318	20	51	43.5	2.974									
12	7	51	10.90	2.9327	20	48	41.7	3.086									
13	7	53	24.89	2.9338	20	45	33.2	3.198									
14	7	55	38.95	2.9348	20	42	18.0	3.310									
15	7	57	53.07	2.9357	20	38	56.0	3.422									
16	8	0	7.24	2.9367	20	35	27.3	3.534									
17	8	2	21.47	2.9377	20	31	51.9	3.647									
18	8	4	35.76	2.9386	20	28	9.7	3.759									
19	8	6	50.10	2.9394	20	24	20.8	3.871									
20	8	9	4.49	2.9403	20	20	25.2	3.982									
21	8	11	18.93	2.9411	20	16	22.9	4.094									
22	8	13	33.42	2.9418	20	12	13.9	4.207									
23	8	15	47.95	2.9426	N.20	7	58.1	4.319									
SUNDAY 30.									PHASES OF THE MOON.								
0	8	18	2.53	2.9433	N.20	3	35.6	4.431	●	New Moon	. . .	Sept.	5	16	56.1		
1	8	20	17.15	2.9440	19	59	6.4	4.542	☾	First Quarter	. . .		12	9	59.9		
2	8	22	31.81	2.9447	19	54	30.5	4.654	○	Full Moon	. . .		19	17	24.3		
3	8	24	46.51	2.9453	19	49	47.9	4.766	☾	Last Quarter	. . .		27	20	30.2		
4	8	27	1.25	2.9459	19	44	58.6	4.877									
5	8	29	16.02	2.9464	19	40	2.6	4.989									
6	8	31	30.82	2.9469	19	34	59.9	5.100									
7	8	33	45.65	2.9474	19	29	50.6	5.211									
8	8	36	0.51	2.9480	19	24	34.6	5.322									
9	8	38	15.41	2.9485	19	19	11.9	5.433									
10	8	40	30.33	2.9489	19	13	42.6	5.543									
11	8	42	45.28	2.9493	19	8	6.7	5.653	☾	Perigee	. . .	Sept.	8	22.7			
12	8	45	0.25	2.9497	19	2	24.2	5.763	☾	Apogee	. . .		24	19.1			
13	8	47	15.24	2.9500	18	56	35.1	5.873									
14	8	49	30.25	2.9504	18	50	39.4	5.983									
15	8	51	45.29	2.9507	18	44	37.1	6.092									
16	8	54	0.34	2.9510	18	38	28.3	6.202									
17	8	56	15.41	2.9513	18	32	12.9	6.311									
18	8	58	30.49	2.9514	18	25	51.0	6.419									
19	9	0	45.58	2.9517	18	19	22.6	6.527									
20	9	3	0.69	2.9519	18	12	47.7	6.635									
21	9	5	15.81	2.9521	18	6	6.4	6.742									
22	9	7	30.94	2.9522	17	59	18.6	6.850									
23	9	9	46.08	2.9524	17	52	24.4	6.957									
24	9	12	1.23	2.9525	N.17	45	23.7	7.064									

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	$\alpha$ Arietis W.	66 19 31	3096	67 49 11	3009	69 19 13	2992	70 49 36	2974
	Aldebaran W.	33 38 33	2849	35 11 57	2835	36 45 39	2821	38 19 39	2807
	SATURN E.	32 17 15	2888	30 44 41	2874	29 11 49	2861	27 38 40	2846
	SUN E.	57 43 1	3207	56 17 0	3193	54 50 43	3179	53 24 9	3164
2	$\alpha$ Arietis W.	78 26 57	2883	79 59 30	2873	81 32 24	2856	83 5 39	2839
	Aldebaran W.	46 14 25	2733	47 50 21	2718	49 26 37	2703	51 3 13	2687
	SUN E.	46 6 49	3088	44 38 25	3073	43 9 43	3058	41 40 42	3043
3	$\alpha$ Arietis W.	90 57 12	2760	92 32 32	2745	94 8 12	2730	95 44 12	2716
	Aldebaran W.	59 11 28	2610	60 50 10	2593	62 29 14	2578	64 8 39	2563
	SUN E.	34 10 54	2968	32 40 1	2954	31 8 50	2939	29 37 21	2926
7	SUN W.	17 46 16	2615	19 24 51	2595	21 3 53	2579	22 43 17	2566
	MARS E.	55 39 26	2464	53 57 22	2460	52 15 12	2456	50 32 57	2453
	JUPITER E.	57 8 30	2277	55 21 56	2272	53 35 15	2267	51 48 27	2263
	Antares E.	66 19 15	2283	64 32 51	2279	62 46 21	2276	60 59 46	2274
8	SUN W.	31 3 57	2525	32 44 35	2521	34 25 19	2517	36 6 9	2514
	MARS E.	42 0 59	2450	40 18 35	2451	38 36 13	2455	36 53 56	2459
	JUPITER E.	42 53 17	2252	41 6 7	2252	39 18 57	2252	37 31 47	2253
	Antares E.	52 6 20	2272	50 19 40	2275	48 33 4	2279	46 46 33	2283
	$\alpha$ Aquilæ E.	99 1 43	2799	97 27 14	2792	95 52 36	2786	94 17 50	2782
9	SUN W.	44 31 3	2509	46 12 4	2509	47 53 5	2510	49 34 4	2512
	Antares E.	37 56 10	2325	36 10 47	2339	34 25 44	2355	32 41 4	2373
	$\alpha$ Aquilæ E.	86 23 25	2786	84 48 39	2791	83 13 59	2797	81 39 27	2805
10	SUN W.	57 58 12	2527	59 38 48	2531	61 19 18	2535	62 59 42	2540
	Spica W.	24 42 9	2399	26 25 45	2380	28 9 49	2366	29 54 13	2355
	$\alpha$ Aquilæ E.	73 50 0	2268	72 17 0	2265	70 44 22	2265	69 12 9	2266
11	SUN W.	71 19 57	2568	72 59 36	2574	74 39 6	2581	76 18 27	2588
	Spica W.	38 38 52	2335	40 24 1	2335	42 9 10	2336	43 54 17	2338
	$\alpha$ Aquilæ E.	61 38 40	3068	60 9 49	3101	58 41 41	3141	57 14 21	3183
	Fomalhaut E.	93 19 41	2475	91 37 53	2481	89 56 13	2487	88 14 42	2494
12	SUN W.	84 32 50	2624	86 11 12	2632	87 49 24	2640	89 27 25	2647
	Spica W.	52 38 56	2356	54 23 34	2360	56 8 6	2365	57 52 31	2371
	$\alpha$ Aquilæ E.	50 11 50	3461	48 50 42	3533	47 30 54	3611	46 12 32	3699
	Fomalhaut E.	79 49 44	2537	78 9 22	2546	76 29 13	2557	74 49 19	2569
	$\alpha$ Pegasi E.	95 39 10	2681	94 2 4	2686	92 25 5	2692	90 48 14	2699
13	SUN W.	97 31 48	2689	99 11 43	2697	100 48 27	2706	102 24 59	2714
	Spica W.	66 32 29	2402	68 16 1	2408	69 59 24	2415	71 42 37	2423
	JUPITER W.	28 25 21	2445	30 7 51	2450	31 50 15	2454	33 32 33	2460
	MARS W.	27 12 0	2681	28 49 1	2681	30 26 6	2680	32 3 12	2681
	Antares W.	21 40 34	2717	23 16 51	2678	24 54 1	2648	26 31 51	2624
	Fomalhaut E.	66 34 1	2635	64 55 54	2651	63 18 8	2667	61 40 44	2684
	$\alpha$ Pegasi E.	82 46 42	2745	81 11 2	2756	79 35 37	2768	78 0 27	2781
14	SUN W.	110 24 47	2758	112 0 10	2767	113 35 21	2776	115 10 20	2785

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	$\alpha$ Arietis	W.	72° 20' 21"	2957	73° 51' 28"	2940	75° 22' 56"	2923	76° 54' 46"	2906
	Aldebaran	W.	39 53 58	2792	41 28 36	2778	43 3 33	2763	44 38 49	2748
	SATURN	E.	26 5 12	2839	24 31 26	2818	22 57 21	2803	21 22 57	2788
	SUN	E.	51 57 17	3150	50 30 8	3134	49 2 40	3119	47 34 54	3104
2	$\alpha$ Arietis	W.	84 39 16	2823	86 13 14	2807	87 47 33	2792	89 22 12	2775
	Aldebaran	W.	52 40 10	2672	54 17 28	2656	55 55 7	2640	57 33 7	2625
	SUN	E.	40 11 22	3097	38 41 43	3012	37 11 45	2997	35 41 29	2982
3	$\alpha$ Arietis	W.	97 20 31	2701	98 57 9	2638	100 34 5	2675	102 11 19	2661
	Aldebaran	W.	65 48 25	2547	67 28 33	2532	69 9 2	2517	70 49 51	2503
	SUN	E.	28 5 35	2913	26 33 33	2902	25 1 17	2891	23 28 47	2882
7	SUN	W.	24 22 59	2555	26 2 56	2545	27 43 6	2538	29 23 27	2531
	MARS	E.	48 50 37	2450	47 8 14	2449	45 25 49	2449	43 43 24	2449
	JUPITER	E.	50 1 33	2260	48 14 34	2257	46 27 81	2255	44 40 25	2253
	Antares	E.	59 13 8	2272	57 26 27	2271	55 39 45	2270	53 53 2	2271
8	SUN	W.	37 47 3	2511	39 28 1	2510	41 9 1	2509	42 50 2	2509
	MARS	E.	35 11 45	2464	33 29 41	2471	31 47 47	2480	30 6 6	2492
	JUPITER	E.	35 44 39	2256	32 57 34	2258	32 10 33	2262	30 23 37	2267
	Antares	E.	45 0 8	2289	43 13 52	2296	41 27 46	2303	39 41 51	2313
	$\alpha$ Aquilæ	E.	92 42 59	2780	91 8 5	2779	89 33 10	2780	87 58 16	2782
9	SUN	W.	51 15 1	2514	52 55 55	2517	54 36 45	2520	56 17 31	2523
	Antares	E.	30 56 51	2396	29 13 11	2423	27 30 9	2455	25 47 52	2494
	$\alpha$ Aquilæ	E.	80 5 5	2614	78 30 55	2625	76 57 0	2638	75 23 21	2652
10	SUN	W.	64 40 0	2545	66 20 11	2551	68 0 14	2556	69 40 10	2562
	Spica	W.	31 38 56	2348	33 23 42	2342	35 8 41	2338	36 53 45	2336
	$\alpha$ Aquilæ	E.	67 40 23	2950	66 9 7	2974	64 38 22	3009	63 8 12	3033
11	SUN	W.	77 57 39	2595	79 36 41	2601	81 15 34	2609	82 54 17	2616
	Spica	W.	45 39 21	2340	47 24 22	2343	49 9 19	2346	50 54 11	2351
	$\alpha$ Aquilæ	E.	55 47 52	3230	54 22 18	3280	52 57 43	3335	51 34 12	3395
	Fomalhaut	E.	86 33 21	2502	84 52 10	2509	83 11 9	2517	81 30 20	2527
12	SUN	W.	91 5 16	2635	92 42 56	2663	94 20 25	2672	95 57 42	2681
	Spica	W.	59 36 48	2377	61 20 56	2382	63 4 56	2389	64 48 47	2395
	$\alpha$ Aquilæ	E.	44 55 44	3795	43 40 37	3902	42 27 19	4019	41 15 58	4150
	Fomalhaut	E.	73 9 41	2580	71 30 19	2593	69 51 14	2607	68 12 28	2621
	$\alpha$ Pegasi	E.	89 11 33	2707	87 35 2	2716	85 58 43	2725	84 22 36	2735
13	SUN	W.	104 1 20	2723	105 37 29	2732	107 13 27	2741	108 49 13	2750
	Spica	W.	73 25 39	2430	75 8 31	2437	76 51 13	2444	78 33 45	2452
	JUPITER	W.	35 14 43	2465	36 56 45	2471	38 38 39	2477	40 20 25	2483
	MARS	W.	33 40 17	2683	35 17 20	2685	36 54 20	2689	38 31 15	2692
	Antares	W.	28 10 13	2607	29 48 59	2593	31 28 3	2583	33 7 21	2576
	Fomalhaut	E.	60 3 43	2703	58 27 7	2722	56 50 57	2744	55 15 15	2766
	$\alpha$ Pegasi	E.	76 25 34	2795	74 50 59	2809	73 16 43	2825	71 42 47	2841
14	SUN	W.	116 45 7	2795	118 19 42	2804	119 54 5	2813	121 28 16	2822

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
14	Spica W.	80 16 6	2460	81 58 16	2467	83 40 16	2475	85 22 5	2482
	JUPITER W.	42 2 2	2490	43 43 29	2497	45 24 47	2504	47 5 55	2511
	MARS W.	40 8 5	2697	41 44 49	2702	43 21 26	2708	44 57 55	2714
	Antares W.	34 46 49	2570	36 26 25	2567	38 6 5	2565	39 45 48	2564
	Fomalhaut E.	53 40 2	2789	52 5 20	2815	50 31 12	2842	48 57 39	2871
	$\alpha$ Pegasi E.	70 9 12	2858	68 35 59	2876	67 3 10	2895	65 30 45	2916
15	SUN W.	123 2 15	2831	124 36 2	2842	126 9 36	2851	127 42 58	2860
	Spica W.	93 48 22	2522	95 29 4	2531	97 9 34	2540	98 49 52	2548
	JUPITER W.	55 29 1	2548	57 9 7	2556	58 49 2	2564	60 28 46	2572
	MARS W.	52 58 19	2747	54 33 57	2754	56 9 25	2761	57 44 44	2769
	Antares W.	48 4 9	2574	49 43 39	2579	51 23 3	2583	53 2 22	2586
	Fomalhaut E.	41 20 23	3063	39 51 28	3113	38 23 34	3168	36 56 47	3231
	$\alpha$ Pegasi E.	57 55 46	3040	56 26 23	3070	54 57 37	3103	53 29 31	3138
	$\alpha$ Arietis E.	99 49 34	2644	98 11 39	2651	96 33 53	2658	94 56 17	2666
16	JUPITER W.	68 44 41	2612	70 23 19	2621	72 1 45	2629	73 40 0	2638
	MARS W.	65 38 47	2808	67 13 4	2816	68 47 11	2825	70 21 7	2832
	Antares W.	61 17 7	2617	62 55 39	2623	64 34 3	2629	66 12 18	2637
	$\alpha$ Pegasi E.	46 20 34	3358	44 57 30	3415	43 35 31	3478	42 14 42	3547
	$\alpha$ Arietis E.	86 50 53	2707	85 14 22	2716	83 38 3	2725	82 1 56	2735
17	JUPITER W.	81 48 25	2681	83 25 31	2689	85 2 25	2698	86 39 8	2707
	MARS W.	78 8 4	2876	79 40 54	2885	81 13 32	2894	82 45 59	2903
	Antares W.	74 21 7	2674	75 58 22	2681	77 35 27	2689	79 12 21	2698
	$\alpha$ Aquile W.	38 0 16	4705	39 1 11	4567	40 4 4	4445	41 8 45	4338
	$\alpha$ Arietis E.	74 4 41	2787	72 29 56	2799	70 55 27	2811	69 21 13	2823
	Aldebaran E.	105 17 5	2624	103 38 43	2632	102 0 32	2641	100 22 33	2649
18	JUPITER W.	94 39 44	2752	96 15 15	2761	97 50 34	2770	99 25 41	2779
	MARS W.	90 25 19	2919	91 56 36	2958	93 27 41	2989	94 58 33	2978
	Antares W.	87 14 5	2741	88 49 51	2749	90 25 26	2758	92 0 49	2767
	$\alpha$ Aquile W.	46 53 46	3952	48 6 13	3898	49 19 35	3850	50 33 46	3808
	$\alpha$ Arietis E.	61 34 16	2892	60 1 47	2908	58 29 38	2924	56 57 50	2941
	Aldebaran E.	92 15 33	2693	90 38 44	2703	89 2 8	2712	87 25 44	2721
19	Antares W.	99 54 42	2815	101 28 51	2824	103 2 48	2834	104 36 32	2843
	$\alpha$ Aquile W.	56 51 15	3654	58 11 51	3634	59 29 49	3615	60 48 7	3599
	$\alpha$ Arietis E.	49 24 29	3039	47 55 5	3062	46 26 9	3087	44 57 44	3114
	Aldebaran E.	79 26 44	2766	77 51 32	2775	76 16 32	2785	74 41 44	2795
20	$\alpha$ Aquile W.	67 23 16	3547	68 42 48	3541	70 2 27	3537	71 22 10	3534
	Fomalhaut W.	32 32 21	3703	33 49 5	3643	35 6 53	3593	36 25 35	3549
	Aldebaran E.	66 50 46	2840	65 17 10	2849	63 43 46	2858	62 10 33	2867
21	$\alpha$ Aquile W.	78 1 19	3532	79 21 8	3535	80 40 54	3537	82 0 37	3542
	Fomalhaut W.	43 9 7	3407	44 31 16	3389	45 53 45	3373	47 16 32	3359
	$\alpha$ Pegasi W.	32 16 38	4590	33 19 11	4465	34 23 34	4356	35 29 35	4261
	Aldebaran E.	54 27 23	2912	52 55 19	2920	51 23 26	2929	49 51 44	2937
	Pollux E.	98 37 31	2945	97 6 9	2953	95 34 57	2962	94 3 56	2969
22	Fomalhaut W.	54 13 38	3318	55 37 29	3313	57 1 26	3308	58 25 28	3306

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XV <sup>b</sup> .	P. L. of Diff.	XVIII <sup>b</sup> .	P. L. of Diff.	XXI <sup>b</sup> .	P. L. of Diff.
14	Spica W.	87° 3 43	2490	88° 45 10	2499	90° 26 25	2507	92° 7 29	2515
	JUPITER W.	48 46 53	2518	50 27 41	2526	52 8 18	2533	53 48 45	2541
	MARS W.	46 34 16	2720	48 10 29	2726	49 46 34	2732	51 22 31	2739
	Antares W.	41 25 32	2565	43 5 15	2566	44 44 56	2569	46 24 34	2571
	Fomalhaut E.	47 24 43	2903	45 52 28	2939	44 20 58	2976	42 50 15	3017
	α Pegasi E.	63 58 47	2939	62 27 17	2961	60 56 15	2985	59 25 44	3019
15	SUN W.	129 16 8	2870	130 49 5	2880	132 21 49	2891	133 54 20	2900
	Spica W.	100 29 59	2556	102 9 54	2565	103 49 37	2574	105 29 8	2583
	JUPITER W.	62 8 19	2580	63 47 41	2588	65 26 52	2596	67 5 52	2604
	MARS W.	59 19 53	2776	60 54 52	2784	62 29 41	2792	64 4 19	2800
	Antares W.	54 41 34	2593	56 20 39	2599	57 59 36	2604	59 38 26	2610
	Fomalhaut F.	35 31 15	3301	34 7 5	3380	32 44 26	3470	31 23 28	3574
	α Pegasi E.	52 2 7	3175	50 35 28	3215	49 9 37	3259	47 44 38	3306
	α Arietis E.	93 18 51	2673	91 41 35	2681	90 4 30	2689	88 27 36	2696
16	JUPITER W.	75 18 4	2646	76 55 57	2655	78 33 38	2663	80 11 7	2672
	MARS W.	71 54 53	2841	73 28 28	2850	75 1 51	2859	76 35 3	2867
	Antares W.	67 50 23	2643	69 28 19	2651	71 6 5	2658	72 43 41	2666
	α Pegasi E.	40 55 10	3023	39 37 0	3706	38 20 19	3798	37 5 15	3903
	α Arietis E.	80 26 2	2745	78 50 22	2755	77 14 55	2765	75 39 41	2775
17	JUPITER W.	88 15 39	2716	89 51 58	2725	91 28 5	2734	93 4 0	2742
	MARS W.	84 18 14	2912	85 50 18	2921	87 22 10	2931	88 53 50	2939
	Antares W.	80 49 4	2706	82 25 36	2714	84 1 57	2722	85 38 7	2732
	α Aquilæ W.	42 15 3	4241	43 22 50	4156	44 31 58	4080	45 42 19	4013
	α Arietis E.	67 47 15	2636	66 13 34	2649	64 40 10	2663	63 7 4	2677
	Aldebaran F.	98 44 45	2658	97 7 9	2667	95 29 45	2676	93 52 33	2685
18	JUPITER W.	101 0 36	2788	102 35 19	2798	104 9 49	2808	105 44 7	2818
	MARS W.	96 29 13	2988	97 59 41	2997	99 29 57	3007	101 0 1	3017
	Antares W.	93 36 0	2776	95 10 59	2785	96 45 46	2795	98 20 20	2805
	α Aquilæ W.	51 48 40	3789	53 4 14	3735	54 20 24	3708	55 37 5	3678
	α Arietis E.	55 26 23	2958	53 55 18	2977	52 24 37	2997	50 54 20	3018
	Aldebaran F.	85 49 32	2730	84 13 32	2739	82 37 44	2748	81 2 8	2757
19	Antares W.	106 10 4	2853	107 43 23	2863	109 16 29	2873	110 49 22	2884
	α Aquilæ W.	62 6 42	3585	63 25 33	3573	64 44 37	3563	66 3 52	3555
	α Arietis E.	43 29 51	3142	42 2 32	3173	40 35 50	3205	39 9 47	3241
	Aldebaran E.	73 7 9	2804	71 32 46	2812	69 58 34	2821	68 24 34	2831
20	α Aquilæ W.	72 41 57	3532	74 1 46	3530	75 21 37	3530	76 41 28	3530
	Fomalhaut W.	37 45 5	3519	39 5 16	3480	40 26 3	3452	41 47 21	3427
	Aldebaran E.	60 37 32	2876	59 4 43	2885	57 32 5	2894	55 59 38	2903
21	α Aquilæ W.	83 20 15	3546	84 39 48	3551	85 59 16	3557	87 18 37	3564
	Fomalhaut W.	48 39 35	3348	50 2 51	3338	51 26 18	3331	52 49 54	3324
	α Pegasi W.	36 37 4	4176	37 45 53	4101	38 55 54	4034	40 7 0	3976
	Aldebaran E.	48 20 12	2946	46 48 51	2954	45 17 40	2962	43 46 39	2970
	Pollux E.	92 33 5	2977	91 2 24	2985	89 31 53	2993	88 1 32	3001
22	Fomalhaut W.	59 49 33	3302	61 12 42	3300	62 37 53	3300	64 2 5	3299

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	III <sup>h</sup>	P. L. of Diff.	VI <sup>h</sup>	P. L. of Diff.	IX <sup>h</sup>	P. L. of Diff.
22	$\alpha$ Pegasi W.	41 19' 3"	3094	42 31' 58"	3078	43 45' 40"	3037	45 0' 4"	3001
	Aldebaran E.	42 15 49	2978	40 45 9	2985	39 14 38	2993	37 44 16	3000
	Pollux E.	86 31 20	3009	85 1 18	3017	83 31 26	3034	82 1 43	3030
23	Fomalhaut W.	65 26 18	3298	66 50 32	3297	68 14 47	3296	69 39 3	3297
	$\alpha$ Pegasi W.	51 20 20	3067	52 37 42	3048	53 55 25	3030	55 13 27	3013
	Aldebaran E.	30 14 38	3034	28 45 7	3040	27 15 44	3047	25 46 29	3052
	Pollux E.	74 35 16	3065	73 6 23	3071	71 37 38	3077	70 9 0	3082
24	Fomalhaut W.	76 40 15	3299	78 4 28	3299	79 28 41	3300	80 52 53	3300
	$\alpha$ Pegasi W.	61 47 29	3553	63 6 55	3543	64 26 32	3535	65 46 18	3525
	Pollux E.	62 47 30	3108	61 19 30	3112	59 51 35	3116	58 23 45	3119
	SATURN E.	86 47 5	3101	85 18 57	3105	83 50 53	3108	82 22 53	3110
	Regulus E.	98 28 30	3065	96 59 38	3069	95 30 51	3073	94 2 8	3075
	SUN E.	131 51 38	3463	130 30 32	3465	129 9 29	3467	127 48 28	3469
25	Fomalhaut W.	87 53 46	3300	89 17 57	3300	90 42 8	3301	92 6 18	3300
	$\alpha$ Pegasi W.	72 27 18	3491	73 47 52	3485	75 8 33	3480	76 29 20	3473
	$\alpha$ Arietis W.	29 8 30	3764	30 24 10	3706	31 40 51	3655	32 58 26	3610
	Pollux E.	51 5 40	3136	49 38 14	3139	48 10 52	3142	46 43 33	3143
	SATURN E.	75 3 25	3116	73 35 35	3116	72 7 45	3115	70 39 54	3114
	Regulus E.	86 39 5	3080	85 10 31	3081	83 41 58	3081	82 13 25	3080
	SUN E.	121 3 48	3473	119 42 54	3472	118 21 59	3472	117 1 4	3471
26	Fomalhaut W.	99 7 22	3295	100 31 39	3294	101 55 57	3233	103 20 16	3292
	$\alpha$ Pegasi W.	83 14 52	3446	84 36 17	3440	85 57 48	3435	87 19 25	3431
	$\alpha$ Arietis W.	39 37 2	3444	40 58 29	3418	42 20 25	3395	43 42 47	3372
	Pollux E.	39 27 35	3155	38 0 32	3158	36 33 32	3161	35 6 36	3163
	SATURN E.	63 20 13	3104	61 52 8	3100	60 23 58	3096	58 55 44	3091
	Regulus E.	74 50 12	3069	73 21 25	3065	71 52 33	3069	70 23 37	3057
	SUN E.	110 15 58	3458	108 54 47	3454	107 33 32	3450	106 12 12	3445
27	$\alpha$ Arietis W.	50 40 36	3276	52 5 15	3259	53 30 14	3242	54 55 33	3226
	Aldebaran W.	17 19 1	3042	18 48 21	3033	20 17 53	3023	21 47 37	3014
	SATURN E.	51 32 58	3062	50 4 2	3055	48 34 57	3047	47 5 43	3039
	Regulus E.	62 57 22	3029	61 27 45	3022	59 57 59	3014	58 28 4	3005
	SUN E.	99 23 56	3413	98 1 54	3405	96 39 43	3397	95 17 23	3387
28	$\alpha$ Arietis W.	62 6 56	3146	63 34 10	3129	65 1 44	3114	66 29 37	3098
	Aldebaran W.	29 19 25	2961	30 50 27	2950	32 21 43	2938	33 53 14	2926
	SATURN E.	39 36 47	2991	38 6 23	2980	36 35 45	2969	35 4 53	2957
	Regulus E.	50 55 45	2959	49 24 41	2948	47 53 23	2938	46 21 52	2926
	SUN E.	88 22 57	3337	86 59 28	3325	85 35 45	3312	84 11 47	3300
29	$\alpha$ Arietis W.	73 53 54	3018	75 23 45	3001	76 53 57	2984	78 24 30	2968
	Aldebaran W.	41 34 51	2859	43 8 2	2845	44 41 32	2830	46 15 21	2815
	Regulus E.	38 40 27	2863	37 7 21	2850	35 33 58	2836	34 0 17	2821
	SUN E.	77 8 10	3231	75 42 37	3215	74 16 46	3199	72 50 36	3184
30	$\alpha$ Arietis W.	86 2 27	2883	87 35 7	2866	89 8 9	2849	90 41 33	2833
	Aldebaran W.	54 9 26	2735	55 45 19	2719	57 21 34	2702	58 58 11	2685
	SUN E.	65 34 58	3101	64 6 50	3083	62 38 20	3065	61 9 28	3047

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	$\alpha$ Pegasi	W.	46° 15' 5"	3768	47° 30' 41"	3739	48° 46' 47"	3719	50° 3' 21"	3689
	Aldebaran	E.	36 14 3	3007	34 43 59	3014	33 14 4	3091	31 44 17	3097
	Pollux	E.	80 32 8	3038	79 2 42	3045	77 33 25	3052	76 4 16	3059
23	Fomalhaut	W.	71 3 18	3297	72 27 33	3298	73 51 47	3298	75 16 1	3298
	$\alpha$ Pegasi	W.	56 31 47	3599	57 50 22	3587	59 9 11	3574	60 28 14	3563
	Aldebaran	E.	24 17 21	3058	22 48 20	3064	21 19 26	3070	19 50 40	3076
	Pollux	E.	68 40 29	3087	67 12 4	3093	65 43 46	3099	64 15 35	3104
24	Fomalhaut	W.	82 17 4	3301	83 41 14	3301	85 5 24	3300	86 29 35	3300
	$\alpha$ Pegasi	W.	67 6 14	3517	68 26 19	3511	69 46 31	3504	71 6 51	3497
	Pollux	E.	56 55 59	3124	55 28 18	3128	54 0 42	3130	52 33 9	3133
	SATURN	E.	80 54 56	3112	79 27 1	3114	77 59 8	3114	76 31 16	3115
	Regulus	E.	92 33 28	3077	91 4 50	3078	89 36 14	3079	88 7 39	3080
	SUN	E.	126 27 29	3471	125 6 32	3472	123 45 37	3479	122 24 42	3473
25	Fomalhaut	W.	93 30 29	3300	94 54 40	3300	96 18 52	3298	97 43 6	3296
	$\alpha$ Pegasi	W.	77 50 14	3468	79 11 14	3469	80 32 21	3456	81 53 34	3452
	$\alpha$ Arietis	W.	34 16 49	3570	35 35 56	3534	36 55 43	3501	38 16 6	3471
	Pollux	E.	45 16 16	3146	43 49 2	3148	42 21 50	3150	40 54 41	3153
	SATURN	E.	69 12 2	3113	67 44 8	3111	66 16 12	3110	64 48 14	3107
	Regulus	E.	80 44 51	3078	79 16 15	3077	77 47 37	3074	76 18 56	3072
	SUN	E.	115 40 8	3470	114 19 10	3467	112 58 9	3464	111 37 5	3462
26	Fomalhaut	W.	104 44 37	3290	106 9 0	3288	107 33 25	3287	108 57 52	3284
	$\alpha$ Pegasi	W.	88 41 7	3425	90 2 55	3420	91 24 49	3414	92 46 50	3408
	$\alpha$ Arietis	W.	45 5 35	3351	46 28 47	3332	47 52 22	3313	49 16 18	3294
	Pollux	E.	33 30 43	3168	32 12 55	3173	30 46 13	3178	29 19 38	3186
	SATURN	E.	57 27 24	3087	55 58 58	3081	54 30 25	3075	53 1 45	3069
	Regulus	E.	68 54 35	3059	67 25 27	3047	65 56 13	3041	64 26 51	3035
	SUN	E.	104 50 46	3439	103 29 14	3433	102 7 35	3427	100 45 49	3421
27	$\alpha$ Arietis	W.	56 21 11	3210	57 47 8	3193	59 13 25	3178	60 40 1	3162
	Aldebaran	W.	23 17 33	3003	24 47 42	2993	26 18 3	2983	27 48 37	2972
	SATURN	E.	45 36 19	3030	44 6 44	3021	42 36 57	3011	41 6 58	3001
	Regulus	E.	56 57 58	2997	55 27 42	2989	53 57 15	2979	52 26 36	2969
	SUN	E.	93 54 52	3378	92 32 10	3368	91 9 17	3358	89 46 13	3348
28	$\alpha$ Arietis	W.	67 57 49	3082	69 26 21	3066	70 55 12	3050	72 24 23	3034
	Aldebaran	W.	35 25 0	2912	36 57 3	2900	38 29 22	2887	40 1 58	2873
	SATURN	E.	33 33 46	2945	32 2 24	2932	30 30 46	2920	28 58 52	2905
	Regulus	E.	44 50 6	2914	43 18 5	2909	41 45 49	2899	40 13 16	2876
	SUN	E.	82 47 35	3287	81 23 8	3273	79 58 25	3259	78 33 26	3245
29	$\alpha$ Arietis	W.	79 55 23	2951	81 26 37	2935	82 58 12	2917	84 30 9	2901
	Aldebaran	W.	47 49 29	2900	49 23 57	2784	50 58 46	2769	52 33 55	2752
	Regulus	E.	32 26 17	2907	30 51 58	2793	29 17 21	2779	27 42 25	2763
	SUN	E.	71 24 8	3169	69 57 21	3152	68 30 14	3134	67 2 46	3118
30	$\alpha$ Arietis	W.	92 15 18	2915	93 40 26	2799	95 23 55	2782	96 58 46	2766
	Aldebaran	W.	60 35 11	2968	62 12 34	2950	63 50 21	2933	65 28 32	2915
	SUN	E.	59 40 14	3030	58 10 38	3012	56 40 40	2993	55 10 19	2975



## AT GREENWICH APPARENT NOON.

AT GREENWICH APPARENT NOON.										
Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.	
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.				
Mon.	1	12 <sup>h</sup> 32 <sup>m</sup> 0.88	9.068	S. 3° 27' 24.0"	-58.21	16' 1.62	64.39	10 32.80	0.786	
Tues.	2	12 35 38.66	9.082	3 50 39.9	58.11	16 1.89	64.43	10 51.52	0.772	
Wed.	3	12 39 16.77	9.096	4 13 53.3	58.00	16 2.17	64.48	11 9.91	0.758	
Thur.	4	12 42 55.23	9.111	4 37 3.8	-57.87	16 2.44	64.53	11 27.95	0.744	
Frid.	5	12 46 34.07	9.126	5 0 10.9	57.72	16 2.72	64.59	11 45.62	0.728	
Sat.	6	12 50 13.29	9.142	5 23 14.2	57.56	16 3.00	64.65	12 2.91	0.712	
SUN.	7	12 53 52.91	9.159	5 46 13.6	-57.38	16 3.28	64.71	12 19.80	0.696	
Mon.	8	12 57 32.94	9.177	6 9 8.4	57.18	16 3.56	64.78	12 36.28	0.677	
Tues.	9	13 1 13.40	9.195	6 31 58.2	56.97	16 3.84	64.85	12 52.33	0.659	
Wed.	10	13 4 54.31	9.214	6 54 42.8	-56.74	16 4.12	64.91	13 7.92	0.640	
Thur.	11	13 8 35.70	9.234	7 17 21.8	56.50	16 4.41	64.98	13 23.04	0.620	
Frid.	12	13 12 17.57	9.255	7 39 54.8	56.24	16 4.69	65.06	13 37.68	0.599	
Sat.	13	13 15 59.94	9.276	8 2 21.4	-55.96	16 4.97	65.14	13 51.83	0.578	
SUN.	14	13 19 42.83	9.298	8 24 41.1	55.67	16 5.25	65.22	14 5.46	0.556	
Mon.	15	13 23 26.25	9.321	8 46 53.5	55.36	16 5.54	65.30	14 18.56	0.533	
Tues.	16	13 27 10.23	9.345	9 8 58.4	-55.03	16 5.82	65.38	14 31.09	0.509	
Wed.	17	13 30 54.80	9.369	9 30 55.4	54.69	16 6.09	65.47	14 43.05	0.485	
Thur.	18	13 34 39.96	9.394	9 52 44.0	54.34	16 6.37	65.56	14 54.41	0.460	
Frid.	19	13 38 25.75	9.420	10 14 23.9	-53.98	16 6.64	65.65	15 5.15	0.434	
Sat.	20	13 42 12.18	9.447	10 35 54.7	53.50	16 6.91	65.75	15 15.25	0.407	
SUN.	21	13 45 59.25	9.475	10 57 16.1	53.19	16 7.18	65.85	15 24.70	0.379	
Mon.	22	13 49 47.01	9.504	11 18 27.7	-52.77	16 7.45	65.95	15 33.47	0.350	
Tues.	23	13 53 35.47	9.534	11 39 29.1	52.34	16 7.71	66.05	15 41.55	0.321	
Wed.	24	13 57 24.64	9.564	12 0 19.9	51.89	16 7.97	66.15	15 48.91	0.291	
Thur.	25	14 1 14.54	9.594	12 20 59.9	-51.43	16 8.23	66.26	15 55.55	0.260	
Frid.	26	14 5 5.19	9.626	12 41 28.5	50.95	16 8.49	66.36	16 1.44	0.229	
Sat.	27	14 8 56.60	9.658	13 1 45.4	50.45	16 8.74	66.47	16 6.57	0.197	
SUN.	28	14 12 48.78	9.691	13 21 50.2	-49.93	16 8.99	66.58	16 10.93	0.164	
Mon.	29	14 16 41.75	9.724	13 41 42.4	49.40	16 9.24	66.69	16 14.50	0.131	
Tues.	30	14 20 35.51	9.757	14 1 21.7	48.85	16 9.49	66.80	16 17.28	0.098	
Wed.	31	14 24 30.08	9.791	14 20 47.7	48.29	16 9.73	66.91	16 19.26	0.064	
Thur.	32	14 28 25.46	9.824	S. 14 39 59.9	-47.71	16 9.98	67.02	16 20.43	0.031	

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.18 from the sidereal time.  
The sign — prefixed to the hourly change of declination indicates that south declinations are increasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
Mon.	1	<sup>h</sup> 12 <sup>m</sup> 32 <sup>s</sup> 2.48	9.070	S. 3° 27' 34.3"	-58.22	<sup>m</sup> 10 32.93	0.786	<sup>h</sup> 12 42 35.42
Tues.	2	12 35 40.31	9.084	3 50 50.5	58.12	10 51.66	0.772	12 46 31.97
Wed.	3	12 39 18.47	9.098	4 14 4.2	58.01	11 10.05	0.758	12 50 28.52
Thur.	4	12 42 56.98	9.113	4 37 14.9	-57.88	11 28.09	0.744	12 54 25.07
Frid.	5	12 46 35.86	9.128	5 0 22.2	57.73	11 45.76	0.728	12 58 21.63
Sat.	6	12 50 15.13	9.144	5 23 25.8	57.57	12 3.05	0.712	13 2 18.18
SUN.	7	12 53 54.79	9.161	5 46 25.4	-57.39	12 19.94	0.695	13 6 14.73
Mon.	8	12 57 34.86	9.179	6 9 20.4	57.19	12 36.42	0.677	13 10 11.28
Tues.	9	13 1 15.37	9.197	6 32 10.5	56.98	12 52.47	0.659	13 14 7.84
Wed.	10	13 4 56.33	9.216	6 54 55.3	-56.75	13 8.06	0.640	13 18 4.39
Thur.	11	13 8 37.76	9.236	7 17 34.5	56.51	13 23.18	0.620	13 22 0.94
Frid.	12	13 12 19.67	9.257	7 40 7.6	56.25	13 37.82	0.599	13 25 57.49
Sat.	13	13 16 2.08	9.278	8 2 34.3	-55.97	13 51.97	0.578	13 29 54.05
SUN.	14	13 19 45.01	9.300	8 24 54.1	55.68	14 5.60	0.556	13 33 50.60
Mon.	15	13 23 28.47	9.323	8 47 6.7	55.37	14 18.69	0.533	13 37 47.16
Tues.	16	13 27 12.49	9.347	9 9 11.7	-55.04	14 31.22	0.509	13 41 43.71
Wed.	17	13 30 57.09	9.371	9 31 8.8	54.70	14 43.17	0.485	13 45 40.26
Thur.	18	13 34 42.29	9.396	9 52 57.5	54.35	14 54.52	0.460	13 49 36.81
Frid.	19	13 38 28.11	9.422	10 14 37.5	-53.98	15 5.26	0.434	13 53 33.37
Sat.	20	13 42 14.57	9.449	10 36 8.4	53.59	15 15.36	0.407	13 57 29.92
SUN.	21	13 46 1.67	9.477	10 57 29.8	53.19	15 24.80	0.379	14 1 26.47
Mon.	22	13 49 49.46	9.506	11 18 41.4	-52.77	15 33.56	0.350	14 5 23.02
Tues.	23	13 53 37.95	9.535	11 39 42.8	52.34	15 41.63	0.321	14 9 19.58
Wed.	24	13 57 27.14	9.565	12 0 33.6	51.89	15 48.99	0.291	14 13 16.13
Thur.	25	14 1 17.07	9.596	12 21 13.5	-51.43	15 55.62	0.260	14 17 12.69
Frid.	26	14 5 7.75	9.627	12 41 42.1	50.95	16 1.50	0.229	14 21 9.24
Sat.	27	14 8 59.18	9.659	13 1 58.9	50.45	16 6.62	0.197	14 25 5.80
SUN.	28	14 12 51.38	9.692	13 22 3.6	-49.93	16 10.97	0.164	14 29 2.35
Mon.	29	14 16 44.37	9.725	13 41 55.7	49.40	16 14.54	0.131	14 32 58.91
Tues.	30	14 20 38.15	9.758	14 1 34.9	48.85	16 17.31	0.098	14 36 55.46
Wed.	31	14 24 32.73	9.792	14 21 0.8	48.29	16 19.28	0.064	14 40 52.01
Thur.	32	14 28 28.13	9.825	S. 14 40 12.9	-47.71	16 20.44	0.031	14 44 48.56

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign — prefixed to the hourly change of declination indicates that south declinations are increasing.

Diff. for 1 Hour,  
+ 9°.8565.  
(Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	275	188° 43' 36.0	43° 14.2	147.75	+ 0.27	0.0001732	-51.4	11 <sup>h</sup> 15 <sup>m</sup> 33.60 <sup>s</sup>
2	276	189 42 43.1	42 21.2	147.84	0.38	0.0000496	51.6	11 11 37.70
3	277	190 41 52.4	41 30.4	147.93	0.47	9.9999255	51.8	11 7 41.79
4	278	191 41 3.9	40 41.8	148.02	+ 0.54	9.9998008	-52.0	11 3 45.88
5	279	192 40 17.5	39 55.3	148.11	0.58	9.9996755	52.3	10 59 49.98
6	280	193 39 33.2	39 10.9	148.20	0.59	9.9995496	52.5	10 55 54.08
7	281	194 38 50.9	38 28.6	148.28	+ 0.57	9.9994231	-52.8	10 51 58.17
8	282	195 38 10.6	37 48.2	148.36	0.52	9.9992962	53.0	10 48 2.26
9	283	196 37 32.1	37 9.7	148.43	0.44	9.9991690	53.1	10 44 6.35
10	284	197 36 55.4	36 32.9	148.51	+ 0.34	9.9990416	-53.1	10 40 10.45
11	285	198 36 20.5	35 57.9	148.58	0.22	9.9989142	53.1	10 36 14.54
12	286	199 35 47.4	35 24.7	148.66	+ 0.09	9.9987867	53.1	10 32 18.63
13	287	200 35 16.0	34 53.2	148.73	- 0.04	9.9986593	-53.0	10 28 22.72
14	288	201 34 46.4	34 23.5	148.81	0.16	9.9985325	52.7	10 24 26.82
15	289	202 34 18.6	33 55.6	148.88	0.28	9.9984064	52.4	10 20 30.91
16	290	203 33 52.6	33 29.5	148.96	- 0.39	9.9982810	-52.1	10 16 35.00
17	291	204 33 28.3	33 5.1	149.03	0.47	9.9981564	51.7	10 12 39.09
18	292	205 33 5.9	32 42.6	149.11	0.53	9.9980328	51.3	10 8 43.19
19	293	206 32 45.5	32 22.1	149.19	- 0.56	9.9979103	-50.8	10 4 47.28
20	294	207 32 27.0	32 3.5	149.27	0.55	9.9977889	50.3	10 0 51.37
21	295	208 32 10.5	31 46.9	149.36	0.52	9.9976687	49.8	9 56 55.46
22	296	209 31 56.1	31 32.4	149.44	- 0.46	9.9975497	-49.3	9 52 59.56
23	297	210 31 43.7	31 19.9	149.53	0.36	9.9974320	48.8	9 49 3.65
24	298	211 31 33.5	31 9.6	149.62	0.25	9.9973155	48.3	9 45 7.74
25	299	212 31 25.5	31 1.5	149.71	- 0.13	9.9972000	-47.9	9 41 11.83
26	300	213 31 19.8	30 55.7	149.80	0.00	9.9970855	47.5	9 37 15.93
27	301	214 31 16.3	30 52.1	149.90	+ 0.13	9.9969721	47.1	9 33 20.02
28	302	215 31 15.0	30 50.6	149.99	+ 0.26	9.9968596	-46.8	9 29 24.11
29	303	216 31 15.8	30 51.3	150.08	0.38	9.9967478	46.5	9 25 28.20
30	304	217 31 18.8	30 54.2	150.17	0.47	9.9966365	46.2	9 21 32.30
31	305	218 31 23.9	30 59.2	150.26	0.55	9.9965259	46.0	9 17 36.39
32	306	219 31 31.1	31 6.2	150.34	+ 0.60	9.9964159	-45.7	9 13 40.48
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>h</sup> .0.								
								Diff. for 1 Hour, — 9 <sup>s</sup> .8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	15 36.0	15 43.3	57 8.5	+2.21	57 35.3	+2.25	21 13.8	2.16	25.3
2	15 50.7	15 58.0	58 2.4	2.25	58 29.2	2.20	22 5.7	2.16	26.3
3	16 5.1	16 11.7	58 55.1	2.09	59 19.4	1.93	22 57.6	2.17	27.3
4	16 17.7	16 23.0	59 41.5	+1.73	60 0.9	+1.48	23 50.0	2.20	28.3
5	16 27.4	16 30.8	60 17.1	1.19	60 29.5	0.87	6		29.3
6	16 33.1	16 34.3	60 38.0	+0.54	60 42.4	+0.20	0 43.3	2.25	0.9
7	16 34.4	16 33.3	60 42.7	-0.15	60 38.9	-0.47	1 38.1	2.32	1.9
8	16 31.3	16 28.4	60 31.5	0.76	60 20.7	1.02	2 34.7	2.40	2.9
9	16 24.6	16 20.2	60 7.0	1.25	59 50.8	1.43	3 32.9	2.45	3.9
10	16 15.3	16 10.1	59 32.8	-1.56	59 13.5	-1.65	4 32.0	2.46	4.9
11	16 4.5	15 58.9	58 53.2	1.71	58 32.4	1.74	5 30.8	2.42	5.9
12	15 53.2	15 47.6	58 11.5	1.73	57 50.9	1.71	6 27.8	2.32	6.9
13	15 42.1	15 36.7	57 30.6	-1.67	57 10.9	-1.61	7 22.2	2.20	7.9
14	15 31.6	15 26.7	56 52.1	1.54	56 34.1	1.47	8 13.5	2.07	8.9
15	15 22.0	15 17.6	56 16.9	1.39	56 0.7	1.31	9 1.7	1.95	9.9
16	15 13.4	15 9.5	55 45.5	-1.23	55 31.2	-1.16	9 47.5	1.86	10.9
17	15 5.9	15 2.5	55 17.8	1.08	55 5.4	1.00	10 31.5	1.80	11.9
18	14 59.4	14 56.5	54 53.9	0.92	54 43.3	0.84	11 14.4	1.77	12.9
19	14 53.9	14 51.6	54 33.7	-0.76	54 25.1	-0.67	11 56.9	1.77	13.9
20	14 49.5	14 47.8	54 17.6	0.58	54 11.3	0.48	12 39.7	1.80	14.9
21	14 46.4	14 45.4	54 6.2	0.37	54 2.5	-0.25	13 23.4	1.85	15.9
22	14 44.8	14 44.6	54 0.2	-0.12	53 59.6	+0.02	14 8.3	1.90	16.9
23	14 44.9	14 45.7	54 0.7	+0.17	54 3.6	0.33	14 54.7	1.97	17.9
24	14 47.1	14 49.0	54 8.6	0.50	54 15.7	0.68	15 42.6	2.02	18.9
25	14 51.5	14 54.7	54 24.9	+0.87	54 36.5	+1.06	16 31.7	2.07	19.9
26	14 58.4	15 2.9	54 50.4	1.26	55 6.6	1.45	17 21.7	2.09	20.9
27	15 7.9	15 13.6	55 25.2	1.64	55 46.0	1.83	18 12.0	2.10	21.9
28	15 19.8	15 26.6	56 9.0	+2.00	56 34.0	+2.15	19 2.4	2.10	22.9
29	15 33.9	15 41.5	57 0.6	2.27	57 28.5	2.36	19 52.8	2.10	23.9
30	15 49.3	15 57.3	57 57.3	2.42	58 26.6	2.43	20 43.3	2.11	24.9
31	16 5.2	16 12.9	58 55.7	2.39	59 23.9	2.29	21 34.4	2.15	25.9
32	16 20.1	16 26.8	59 50.5	+2.12	60 14.8	+1.90	22 26.8	2.22	26.9

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 1.					WEDNESDAY 3.				
0	9 12 1.23	2.2525	N.17° 45' 23.7	7.064	0	11 0 5.68	2.2504	N.10° 13' 44.6	11.486
1	9 14 16.38	2.2526	17 38 16.7	7.170	1	11 2 20.71	2.2506	10 2 13.3	11.557
2	9 16 31.54	2.2527	17 31 3.3	7.276	2	11 4 35.75	2.2507	9 50 37.7	11.628
3	9 18 46.70	2.2528	17 23 43.6	7.381	3	11 6 50.79	2.2508	9 38 57.9	11.698
4	9 21 1.87	2.2528	17 16 17.6	7.486	4	11 9 5.84	2.2509	9 27 13.9	11.767
5	9 23 17.04	2.2528	17 8 45.3	7.590	5	11 11 20.90	2.2511	9 15 25.8	11.835
6	9 25 32.21	2.2529	17 1 6.8	7.694	6	11 13 35.98	2.2514	9 3 33.7	11.902
7	9 27 47.39	2.2529	16 53 22.1	7.798	7	11 15 51.07	2.2516	8 51 37.6	11.967
8	9 30 2.56	2.2528	16 45 31.1	7.902	8	11 18 6.17	2.2518	8 39 37.6	12.032
9	9 32 17.73	2.2528	16 37 33.9	8.005	9	11 20 21.28	2.2520	8 27 33.7	12.096
10	9 34 32.90	2.2528	16 29 30.5	8.107	10	11 22 36.41	2.2523	8 15 26.1	12.158
11	9 36 48.07	2.2527	16 21 21.1	8.208	11	11 24 51.56	2.2527	8 3 14.7	12.220
12	9 39 3.23	2.2527	16 13 5.6	8.308	12	11 27 6.73	2.2530	7 50 59.7	12.279
13	9 41 18.39	2.2527	16 4 44.1	8.409	13	11 29 21.92	2.2533	7 38 41.2	12.338
14	9 43 33.55	2.2526	15 56 16.5	8.510	14	11 31 37.13	2.2537	7 26 19.2	12.396
15	9 45 48.70	2.2525	15 47 42.9	8.609	15	11 33 52.36	2.2541	7 13 53.7	12.453
16	9 48 3.85	2.2524	15 39 3.4	8.708	16	11 36 7.62	2.2546	7 1 24.9	12.508
17	9 50 18.99	2.2523	15 30 18.0	8.807	17	11 38 22.91	2.2551	6 48 52.8	12.562
18	9 52 34.13	2.2522	15 21 26.6	8.905	18	11 40 38.23	2.2556	6 36 17.5	12.614
19	9 54 49.26	2.2521	15 12 29.4	9.002	19	11 42 53.58	2.2561	6 23 39.1	12.668
20	9 57 4.38	2.2520	15 3 26.4	9.098	20	11 45 8.96	2.2566	6 10 57.6	12.716
21	9 59 19.50	2.2519	14 54 17.7	9.193	21	11 47 24.37	2.2572	5 58 13.2	12.764
22	10 1 34.61	2.2518	14 45 3.2	9.288	22	11 49 39.82	2.2578	5 45 25.9	12.812
23	10 3 49.72	2.2517	N.14 35 43.1	9.383	23	11 51 55.31	2.2585	N. 5 32 35.8	12.858
TUESDAY 2.					THURSDAY 4.				
0	10 6 4.82	2.2516	N.14 26 17.3	9.477	0	11 54 10.84	2.2592	N. 5 19 42.9	12.903
1	10 8 19.91	2.2514	14 16 45.9	9.570	1	11 56 26.41	2.2598	5 6 47.4	12.947
2	10 10 34.99	2.2513	14 7 8.9	9.662	2	11 58 42.02	2.2605	4 53 49.3	12.989
3	10 12 50.07	2.2512	13 57 26.4	9.753	3	12 0 57.67	2.2613	4 40 48.7	13.030
4	10 15 5.14	2.2511	13 47 38.5	9.844	4	12 3 13.37	2.2621	4 27 45.7	13.070
5	10 17 20.20	2.2510	13 37 45.1	9.935	5	12 5 29.12	2.2630	4 14 40.3	13.108
6	10 19 35.26	2.2509	13 27 46.3	10.024	6	12 7 44.93	2.2639	4 1 32.7	13.145
7	10 21 50.31	2.2508	13 17 42.2	10.113	7	12 10 0.79	2.2647	3 48 22.9	13.181
8	10 24 5.36	2.2507	13 7 32.8	10.201	8	12 12 16.70	2.2656	3 35 11.0	13.214
9	10 26 20.40	2.2506	12 57 18.1	10.287	9	12 14 32.66	2.2665	3 21 57.2	13.246
10	10 28 35.43	2.2505	12 46 58.3	10.373	10	12 16 48.68	2.2675	3 8 41.5	13.277
11	10 30 50.46	2.2505	12 36 33.3	10.459	11	12 19 4.76	2.2686	2 55 23.9	13.308
12	10 33 5.49	2.2504	12 26 3.2	10.543	12	12 21 20.91	2.2697	2 42 4.5	13.337
13	10 35 20.51	2.2503	12 15 28.1	10.627	13	12 23 37.12	2.2708	2 28 43.5	13.363
14	10 37 35.53	2.2502	12 4 48.0	10.709	14	12 25 53.40	2.2719	2 15 20.9	13.388
15	10 39 50.54	2.2502	11 54 3.0	10.791	15	12 28 9.75	2.2730	2 1 56.9	13.412
16	10 42 5.56	2.2502	11 43 13.1	10.872	16	12 30 26.17	2.2742	1 48 31.5	13.435
17	10 44 20.57	2.2502	11 32 18.3	10.953	17	12 32 42.66	2.2755	1 35 4.7	13.457
18	10 46 35.58	2.2502	11 21 18.7	11.032	18	12 34 59.23	2.2768	1 21 36.7	13.478
19	10 48 50.59	2.2502	11 10 14.5	11.109	19	12 37 15.88	2.2782	1 8 7.6	13.493
20	10 51 5.60	2.2503	10 59 5.6	11.186	20	12 39 32.61	2.2795	0 54 37.5	13.510
21	10 53 20.62	2.2503	10 47 52.1	11.262	21	12 41 49.42	2.2808	0 41 6.4	13.525
22	10 55 35.64	2.2503	10 36 34.1	11.337	22	12 44 6.31	2.2822	0 27 34.5	13.538
23	10 57 50.66	2.2503	10 25 11.6	11.412	23	12 46 23.28	2.2836	0 14 1.9	13.549
24	11 0 5.68	2.2504	N.10 13 44.6	11.486	24	12 48 40.34	2.2851	N. 0 0 28.6	13.560

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 5.					SUNDAY 7.				
0	12 <sup>h</sup> 48 <sup>m</sup> 40.34 <sup>s</sup>	2.9851	N. 0° 0' 28.6"	13.560	0	14 <sup>h</sup> 40 <sup>m</sup> 42.64 <sup>s</sup>	2.3838	S. 10° 31' 35.0"	12.145
1	12 50 57.49	2.9867	S. 0 13 5.3	13.568	1	14 43 6.35	2.3866	10 43 41.6	12.076
2	12 53 14.74	2.9882	0 26 39.6	13.575	2	14 45 30.23	2.3895	10 55 44.1	12.006
3	12 55 32.08	2.9898	0 40 14.3	13.581	3	14 47 54.29	2.4024	11 7 42.3	11.933
4	12 57 49.52	2.9915	0 53 49.3	13.585	4	14 50 18.52	2.4052	11 19 36.1	11.859
5	13 0 7.06	2.9932	1 7 24.5	13.587	5	14 52 42.91	2.4079	11 31 25.4	11.783
6	13 2 24.70	2.9949	1 20 59.8	13.588	6	14 55 7.47	2.4107	11 43 10.1	11.706
7	13 4 42.45	2.9966	1 34 35.1	13.587	7	14 57 32.20	2.4136	11 54 50.1	11.627
8	13 7 0.30	2.9983	1 48 10.3	13.585	8	14 59 57.10	2.4165	12 6 25.3	11.547
9	13 9 18.25	2.3001	2 1 45.3	13.581	9	15 2 22.18	2.4194	12 17 55.7	11.465
10	13 11 36.31	2.3090	2 15 20.0	13.575	10	15 4 47.43	2.4222	12 29 21.1	11.382
11	13 13 54.49	2.3030	2 28 54.3	13.568	11	15 7 12.84	2.4249	12 40 41.5	11.298
12	13 16 12.78	2.3058	2 42 28.2	13.560	12	15 9 38.42	2.4277	12 51 56.8	11.212
13	13 18 31.19	2.3078	2 56 1.5	13.549	13	15 12 4.17	2.4306	13 3 6.9	11.123
14	13 20 49.72	2.3097	3 9 34.1	13.537	14	15 14 30.09	2.4334	13 14 11.6	11.033
15	13 23 8.36	2.3117	3 23 5.9	13.523	15	15 16 56.18	2.4362	13 25 10.9	10.943
16	13 25 27.13	2.3138	3 36 36.9	13.508	16	15 19 22.44	2.4390	13 36 4.7	10.851
17	13 27 46.02	2.3158	3 50 6.9	13.491	17	15 21 48.86	2.4417	13 46 53.0	10.757
18	13 30 5.03	2.3179	4 3 35.8	13.472	18	15 24 15.45	2.4445	13 57 35.6	10.662
19	13 32 24.17	2.3201	4 17 3.6	13.452	19	15 26 42.20	2.4472	14 8 12.4	10.566
20	13 34 43.45	2.3224	4 30 30.1	13.430	20	15 29 9.12	2.4500	14 18 43.5	10.469
21	13 37 2.86	2.3246	4 43 55.2	13.407	21	15 31 36.20	2.4527	14 29 8.7	10.370
22	13 39 22.40	2.3268	4 57 18.9	13.382	22	15 34 3.44	2.4554	14 39 27.9	10.269
23	13 41 42.08	2.3291	S. 5 10 41.0	13.354	23	15 36 30.85	2.4581	S. 14 49 41.0	10.167
SATURDAY 6.					MONDAY 8.				
0	13 44 1.89	2.3314	S. 5 24 1.4	13.326	0	15 38 58.42	2.4607	S. 14 59 48.0	10.065
1	13 46 21.84	2.3337	5 37 20.1	13.296	1	15 41 26.14	2.4633	15 9 48.8	9.961
2	13 48 41.93	2.3361	5 50 36.9	13.263	2	15 43 54.02	2.4660	15 19 43.3	9.854
3	13 51 2.17	2.3385	6 3 51.7	13.230	3	15 46 22.06	2.4686	15 29 31.3	9.747
4	13 53 22.55	2.3409	6 17 4.5	13.195	4	15 48 50.25	2.4711	15 39 12.9	9.639
5	13 55 43.08	2.3433	6 30 15.1	13.158	5	15 51 18.59	2.4737	15 48 48.0	9.530
6	13 58 3.75	2.3457	6 43 23.5	13.120	6	15 53 47.09	2.4762	15 58 16.5	9.419
7	14 0 24.57	2.3482	6 56 29.5	13.080	7	15 56 15.73	2.4786	16 7 38.3	9.307
8	14 2 45.54	2.3508	7 9 33.1	13.038	8	15 58 44.52	2.4810	16 16 53.4	9.195
9	14 5 6.67	2.3534	7 22 34.1	12.994	9	16 1 13.45	2.4833	16 26 1.7	9.081
10	14 7 27.95	2.3559	7 35 32.4	12.949	10	16 3 42.52	2.4857	16 35 3.1	8.966
11	14 9 49.38	2.3585	7 48 28.0	12.902	11	16 6 11.73	2.4880	16 43 57.6	8.849
12	14 12 10.97	2.3612	8 1 20.7	12.854	12	16 8 41.08	2.4902	16 52 45.0	8.731
13	14 14 32.72	2.3638	8 14 10.5	12.804	13	16 11 10.56	2.4924	17 1 25.3	8.612
14	14 16 54.63	2.3664	8 26 57.2	12.752	14	16 13 40.17	2.4946	17 9 58.5	8.493
15	14 19 16.69	2.3690	8 39 40.8	12.699	15	16 16 9.91	2.4967	17 18 24.5	8.372
16	14 21 38.91	2.3718	8 52 21.1	12.644	16	16 18 39.78	2.4989	17 26 43.2	8.251
17	14 24 1.30	2.3746	9 4 58.1	12.587	17	16 21 9.78	2.5010	17 34 54.6	8.128
18	14 26 23.86	2.3773	9 17 31.6	12.529	18	16 23 39.90	2.5029	17 42 58.6	8.005
19	14 28 46.58	2.3800	9 30 1.6	12.469	19	16 26 10.13	2.5048	17 50 55.2	7.880
20	14 31 9.46	2.3827	9 42 27.9	12.407	20	16 28 40.48	2.5067	17 58 44.2	7.754
21	14 33 32.50	2.3854	9 54 50.5	12.345	21	16 31 10.94	2.5085	18 6 25.6	7.627
22	14 35 55.71	2.3882	10 7 9.3	12.281	22	16 33 41.50	2.5102	18 13 59.4	7.500
23	14 38 19.09	2.3911	10 19 24.2	12.214	23	16 36 12.17	2.5120	18 21 25.6	7.372
24	14 40 42.64	2.3938	S. 10 31 35.0	12.145	24	16 38 42.94	2.5137	S. 18 28 44.1	7.243

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 9.					THURSDAY 11.				
0	<sup>h</sup> 16 <sup>m</sup> 38 <sup>s</sup> 42.94	2.5137	S. 18° 28' 44.1"	7.243	0	<sup>h</sup> 18 <sup>m</sup> 39 <sup>s</sup> 53.60	2.5049	S. 21° 37' 15.2"	0.591
1	16 41 13.81	2.5153	18 35 54.8	7.113	1	18 42 23.79	2.5090	21 37 42.2	0.380
2	16 43 44.77	2.5168	18 42 57.6	6.982	2	18 44 53.84	2.4997	21 38 0.8	0.940
3	16 46 15.82	2.5183	18 49 52.6	6.850	3	18 47 23.75	2.4973	21 38 11.0	- 0.100
4	16 48 46.96	2.5196	18 56 39.6	6.718	4	18 49 53.52	2.4948	21 38 12.8	+ 0.040
5	16 51 18.18	2.5209	19 3 18.7	6.585	5	18 52 23.13	2.4922	21 38 6.2	0.180
6	16 53 49.47	2.5222	19 9 49.8	6.451	6	18 54 52.59	2.4896	21 37 51.2	0.319
7	16 56 20.84	2.5234	19 16 12.8	6.316	7	18 57 21.89	2.4869	21 37 27.9	0.457
8	16 58 52.28	2.5245	19 22 27.7	6.182	8	18 59 51.02	2.4843	21 36 56.4	0.594
9	17 1 23.78	2.5256	19 28 34.6	6.047	9	19 2 19.99	2.4813	21 36 16.6	0.732
10	17 3 55.35	2.5266	19 34 33.3	5.910	10	19 4 48.78	2.4783	21 35 28.6	0.869
11	17 6 26.97	2.5275	19 40 23.8	5.772	11	19 7 17.39	2.4753	21 34 32.4	1.006
12	17 8 58.65	2.5284	19 46 6.0	5.635	12	19 9 45.82	2.4722	21 33 27.9	1.142
13	17 11 30.38	2.5292	19 51 40.0	5.497	13	19 12 14.06	2.4691	21 32 15.3	1.277
14	17 14 2.15	2.5299	19 57 5.7	5.358	14	19 14 42.11	2.4659	21 30 54.7	1.411
15	17 16 33.96	2.5305	20 2 23.0	5.219	15	19 17 9.97	2.4627	21 29 26.0	1.545
16	17 19 5.81	2.5310	20 7 32.0	5.080	16	19 19 37.63	2.4593	21 27 49.3	1.679
17	17 21 37.68	2.5314	20 12 32.6	4.940	17	19 22 5.08	2.4558	21 26 4.6	1.812
18	17 24 9.58	2.5318	20 17 24.8	4.800	18	19 24 32.33	2.4523	21 24 11.9	1.944
19	17 26 41.50	2.5321	20 22 8.6	4.659	19	19 26 59.36	2.4488	21 22 11.3	2.075
20	17 29 13.43	2.5324	20 26 43.9	4.517	20	19 29 26.18	2.4452	21 20 2.9	2.205
21	17 31 45.38	2.5326	20 31 10.7	4.376	21	19 31 52.78	2.4415	21 17 46.7	2.335
22	17 34 17.34	2.5328	20 35 29.0	4.234	22	19 34 19.16	2.4377	21 15 22.7	2.465
23	17 36 49.29	2.5325	S. 20° 39' 38.8"	4.092	23	19 36 45.31	2.4339	S. 21° 12' 50.9"	2.594
WEDNESDAY 10.					FRIDAY 12.				
0	17 39 21.24	2.5334	S. 20° 43' 40.1"	3.950	0	19 39 11.23	2.4301	S. 21° 10' 11.4"	2.722
1	17 41 53.18	2.5339	20 47 32.8	3.807	1	19 41 36.92	2.4269	21 7 24.2	2.849
2	17 44 25.11	2.5350	20 51 17.0	3.665	2	19 44 2.37	2.4232	21 4 20.5	2.975
3	17 46 57.02	2.5317	20 54 52.6	3.522	3	19 46 27.58	2.4182	21 1 27.2	3.101
4	17 49 28.91	2.5312	20 58 19.6	3.379	4	19 48 52.55	2.4141	20 58 17.4	3.225
5	17 52 0.76	2.5306	21 1 38.0	3.236	5	19 51 17.27	2.4100	20 55 0.2	3.349
6	17 54 32.58	2.5300	21 4 47.9	3.093	6	19 53 41.75	2.4058	20 51 35.5	3.473
7	17 57 4.36	2.5293	21 7 49.2	2.949	7	19 56 5.97	2.4016	20 48 3.4	3.595
8	17 59 36.10	2.5286	21 10 41.8	2.805	8	19 58 29.94	2.3973	20 44 24.1	3.716
9	18 2 7.79	2.5277	21 13 25.8	2.662	9	20 0 53.65	2.3930	20 40 37.5	3.837
10	18 4 39.42	2.5267	21 16 1.2	2.518	10	20 3 17.10	2.3887	20 36 43.7	3.957
11	18 7 10.99	2.5257	21 18 28.0	2.375	11	20 5 40.29	2.3843	20 32 42.7	4.076
12	18 9 42.50	2.5246	21 20 46.2	2.232	12	20 8 3.22	2.3799	20 28 34.6	4.193
13	18 12 13.94	2.5233	21 22 55.8	2.088	13	20 10 25.88	2.3754	20 24 19.5	4.310
14	18 14 45.30	2.5220	21 24 56.8	1.944	14	20 12 48.27	2.3709	20 19 57.4	4.427
15	18 17 16.58	2.5206	21 26 49.1	1.801	15	20 15 10.39	2.3663	20 15 28.3	4.542
16	18 19 47.77	2.5191	21 28 32.9	1.658	16	20 17 52.23	2.3618	20 10 52.4	4.656
17	18 22 18.87	2.5175	21 30 8.1	1.515	17	20 19 53.80	2.3572	20 6 9.6	4.770
18	18 24 49.87	2.5158	21 31 34.7	1.372	18	20 22 15.09	2.3525	20 1 20.0	4.882
19	18 27 20.77	2.5141	21 32 52.8	1.230	19	20 24 36.10	2.3478	19 56 23.7	4.994
20	18 29 51.57	2.5124	21 34 2.3	1.087	20	20 26 56.83	2.3432	19 51 20.7	5.104
21	18 32 22.26	2.5105	21 35 3.3	0.945	21	20 29 17.28	2.3385	19 46 11.2	5.213
22	18 34 52.83	2.5085	21 35 55.7	0.803	22	20 31 37.45	2.3337	19 40 55.1	5.322
23	18 37 23.28	2.5064	21 36 39.7	0.662	23	20 33 57.33	2.3289	19 35 32.5	5.431
24	18 39 53.60	2.5042	S. 21° 37' 15.2"	0.521	24	20 36 16.92	2.3241	S. 19° 30' 3.4"	5.539

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 13.					MONDAY 15.				
0	<sup>h</sup> 20 <sup>m</sup> 36 <sup>s</sup> 16.92	2.3941	S. 19° 30' 3.4	5.538	0	<sup>h</sup> 22 <sup>m</sup> 22 <sup>s</sup> 15.18	2.0956	S. 13° 20' 26.4	9.474
1	20 38 36.22	2.3183	19 24 28.0	5.643	1	22 24 20.79	2.0913	13 10 56.2	9.531
2	20 40 55.24	2.3146	19 18 46.2	5.748	2	22 26 26.14	2.0871	13 1 22.7	9.588
3	20 43 13.97	2.3098	19 12 58.2	5.852	3	22 28 31.24	2.0829	12 51 45.9	9.641
4	20 45 32.41	2.3048	19 7 4.0	5.954	4	22 30 36.08	2.0787	12 42 5.8	9.696
5	20 47 50.55	2.2999	19 1 3.7	6.056	5	22 32 40.68	2.0746	12 32 22.4	9.750
6	20 50 8.40	2.2951	18 54 57.3	6.157	6	22 34 45.03	2.0705	12 22 35.8	9.802
7	20 52 25.96	2.2902	18 48 44.9	6.257	7	22 36 49.14	2.0664	12 12 46.1	9.854
8	20 54 43.22	2.2853	18 42 26.5	6.356	8	22 38 53.00	2.0623	12 2 53.3	9.904
9	20 57 0.19	2.2804	18 36 2.2	6.453	9	22 40 56.62	2.0583	11 52 57.6	9.953
10	20 59 16.87	2.2755	18 29 32.1	6.550	10	22 43 0.00	2.0544	11 42 58.9	10.002
11	21 1 33.25	2.2706	18 22 56.2	6.647	11	22 45 3.15	2.0505	11 32 57.3	10.050
12	21 3 49.33	2.2656	18 16 14.5	6.742	12	22 47 6.06	2.0466	11 22 52.9	10.097
13	21 6 5.12	2.2607	18 9 27.2	6.835	13	22 49 8.74	2.0428	11 12 45.7	10.143
14	21 8 20.61	2.2557	18 2 34.3	6.927	14	22 51 11.19	2.0390	11 2 35.7	10.188
15	21 10 35.80	2.2507	17 55 35.9	7.019	15	22 53 13.42	2.0352	10 52 23.1	10.232
16	21 12 50.70	2.2458	17 48 32.0	7.110	16	22 55 15.42	2.0315	10 42 7.9	10.275
17	21 15 5.30	2.2409	17 41 22.7	7.199	17	22 57 17.20	2.0279	10 31 50.1	10.317
18	21 17 19.61	2.2360	17 34 8.1	7.288	18	22 59 18.77	2.0243	10 21 29.8	10.359
19	21 19 33.62	2.2311	17 26 48.2	7.376	19	23 1 20.12	2.0207	10 11 7.0	10.399
20	21 21 47.34	2.2262	17 19 23.0	7.462	20	23 3 21.25	2.0171	10 0 41.9	10.438
21	21 24 0.76	2.2213	17 11 52.7	7.547	21	23 5 22.17	2.0136	9 50 14.5	10.476
22	21 26 13.89	2.2164	17 4 17.3	7.632	22	23 7 22.88	2.0102	9 39 44.8	10.514
23	21 28 26.73	2.2115	S. 16° 56' 36.8	7.716	23	23 9 23.39	2.0068	S. 9° 29' 12.8	10.551
SUNDAY 14.					TUESDAY 16.				
0	21 30 39.27	2.2066	S. 16° 48' 51.4	7.798	0	23 11 23.70	2.0035	S. 9° 18' 38.7	10.586
1	21 32 51.52	2.2017	16 41 1.0	7.880	1	23 13 23.81	2.0002	9 8 2.5	10.621
2	21 35 3.48	2.1969	16 33 5.8	7.960	2	23 15 23.72	1.9969	8 57 24.2	10.656
3	21 37 15.15	2.1921	16 25 5.8	8.039	3	23 17 23.43	1.9936	8 46 43.8	10.689
4	21 39 26.53	2.1872	16 17 1.1	8.117	4	23 19 22.95	1.9904	8 36 1.5	10.721
5	21 41 37.62	2.1824	16 8 51.7	8.195	5	23 21 22.28	1.9872	8 25 17.3	10.752
6	21 43 48.42	2.1777	16 0 37.7	8.271	6	23 23 21.42	1.9842	8 14 31.2	10.783
7	21 45 58.94	2.1729	15 52 19.2	8.347	7	23 25 20.38	1.9812	8 3 43.3	10.813
8	21 48 9.17	2.1681	15 43 56.1	8.421	8	23 27 19.16	1.9782	7 52 53.7	10.841
9	21 50 19.11	2.1633	15 35 28.6	8.494	9	23 29 17.76	1.9752	7 42 2.4	10.869
10	21 52 28.77	2.1586	15 26 56.8	8.567	10	23 31 16.18	1.9723	7 31 9.4	10.897
11	21 54 38.15	2.1540	15 18 20.6	8.638	11	23 33 14.43	1.9694	7 20 14.8	10.923
12	21 56 47.25	2.1493	15 9 40.2	8.708	12	23 35 12.51	1.9666	7 9 18.7	10.948
13	21 58 56.07	2.1447	15 0 55.7	8.777	13	23 37 10.42	1.9639	6 58 21.1	10.973
14	22 1 4.62	2.1402	14 52 7.0	8.846	14	23 39 8.17	1.9612	6 47 22.0	10.997
15	22 3 12.89	2.1356	14 43 14.2	8.913	15	23 41 5.76	1.9585	6 36 21.5	11.019
16	22 5 20.89	2.1310	14 34 17.4	8.979	16	23 43 3.19	1.9558	6 25 19.7	11.041
17	22 7 28.61	2.1264	14 25 16.7	9.044	17	23 45 0.46	1.9532	6 14 16.6	11.062
18	22 9 36.06	2.1219	14 16 12.1	9.108	18	23 46 57.58	1.9507	6 3 12.3	11.082
19	22 11 43.24	2.1175	14 7 3.7	9.171	19	23 48 54.55	1.9482	5 52 6.8	11.102
20	22 13 50.16	2.1131	13 57 51.5	9.233	20	23 50 51.37	1.9457	5 41 0.1	11.120
21	22 15 56.81	2.1087	13 48 35.7	9.294	21	23 52 48.04	1.9434	5 29 52.4	11.138
22	22 18 3.20	2.1042	13 39 16.2	9.355	22	23 54 44.57	1.9411	5 18 43.6	11.155
23	22 20 9.32	2.0999	13 29 53.1	9.415	23	23 56 40.97	1.9388	5 7 33.8	11.172
24	22 22 15.18	2.0956	S. 13° 20' 26.4	9.474	24	23 58 37.23	1.9366	S. 4° 56' 23.0	11.187



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 17.					FRIDAY 19.				
0	<sup>h</sup> 23 <sup>m</sup> 58 <sup>s</sup> 37.23	1.9366	S. 4° 56' 23.0	11.187	0	<sup>h</sup> 1 <sup>m</sup> 29 <sup>s</sup> 53.37	1.8842	N. 4° 3' 30.1	11.092
1	0 0 33.36	1.9344	4 45 11.3	11.202	1	1 31 46.42	1.8843	4 14 30.8	11.000
2	0 2 29.36	1.9322	4 33 58.8	11.215	2	1 33 39.48	1.8843	4 25 30.1	10.978
3	0 4 25.22	1.9300	4 22 45.5	11.228	3	1 35 32.54	1.8843	4 36 28.1	10.955
4	0 6 20.96	1.9280	4 11 31.5	11.240	4	1 37 25.60	1.8845	4 47 24.7	10.932
5	0 8 16.58	1.9260	4 0 16.7	11.252	5	1 39 18.68	1.8847	4 58 19.9	10.908
6	0 10 12.08	1.9241	3 49 1.3	11.262	6	1 41 11.77	1.8850	5 9 13.7	10.884
7	0 12 7.47	1.9222	3 37 45.3	11.272	7	1 43 4.88	1.8852	5 20 6.0	10.858
8	0 14 2.74	1.9203	3 26 28.7	11.281	8	1 44 58.00	1.8855	5 30 56.7	10.832
9	0 15 57.90	1.9185	3 15 11.6	11.289	9	1 46 51.14	1.8858	5 41 45.8	10.805
10	0 17 52.96	1.9167	3 3 54.0	11.297	10	1 48 44.30	1.8862	5 52 33.3	10.777
11	0 19 47.91	1.9150	2 52 36.0	11.303	11	1 50 37.49	1.8867	6 3 19.1	10.749
12	0 21 42.76	1.9133	2 41 17.6	11.309	12	1 52 30.70	1.8871	6 14 3.2	10.721
13	0 23 37.51	1.9117	2 29 58.9	11.314	13	1 54 23.94	1.8876	6 24 45.6	10.692
14	0 25 32.17	1.9102	2 18 39.9	11.318	14	1 56 17.22	1.8882	6 35 26.2	10.661
15	0 27 26.73	1.9086	2 7 20.7	11.322	15	1 58 10.53	1.8888	6 46 4.9	10.630
16	0 29 21.20	1.9071	1 56 1.3	11.324	16	2 0 3.88	1.8895	6 56 41.8	10.596
17	0 31 15.58	1.9057	1 44 41.8	11.326	17	2 1 57.27	1.8902	7 7 16.7	10.566
18	0 33 9.88	1.9043	1 33 22.2	11.327	18	2 3 50.70	1.8908	7 17 49.7	10.533
19	0 35 4.09	1.9029	1 22 2.5	11.328	19	2 5 44.17	1.8915	7 28 20.7	10.500
20	0 36 58.23	1.9016	1 10 42.8	11.328	20	2 7 37.68	1.8922	7 38 49.7	10.466
21	0 38 52.29	1.9004	0 59 23.1	11.327	21	2 9 31.24	1.8931	7 49 16.6	10.431
22	0 40 46.28	1.8992	0 48 3.5	11.325	22	2 11 24.85	1.8940	7 59 41.4	10.395
23	0 42 40.20	1.8981	S. 0° 36' 44.1	11.322	23	2 13 18.52	1.8949	N. 8° 10' 4.0	10.358
THURSDAY 18.					SATURDAY 20.				
0	0 44 34.05	1.8970	S. 0° 25' 24.9	11.318	0	2 15 12.24	1.8958	N. 8° 20' 24.4	10.321
1	0 46 27.84	1.8959	0 14 5.9	11.314	1	2 17 6.02	1.8968	8 30 42.6	10.284
2	0 48 21.56	1.8948	S. 0 2 47.2	11.310	2	2 18 59.86	1.8978	8 40 58.5	10.246
3	0 50 15.22	1.8939	N. 0 8 31.3	11.305	3	2 20 53.76	1.8988	8 51 12.1	10.207
4	0 52 8.83	1.8931	0 19 49.4	11.299	4	2 22 47.72	1.8996	9 1 23.4	10.168
5	0 54 2.39	1.8922	0 31 7.1	11.292	5	2 24 41.74	1.9009	9 11 32.3	10.128
6	0 55 55.89	1.8913	0 42 24.4	11.284	6	2 26 35.83	1.9021	9 21 38.7	10.087
7	0 57 49.34	1.8905	0 53 41.2	11.275	7	2 28 29.99	1.9033	9 31 42.7	10.046
8	0 59 42.75	1.8898	1 4 57.4	11.266	8	2 30 24.23	1.9046	9 41 44.2	10.003
9	1 1 36.12	1.8892	1 16 13.1	11.257	9	2 32 18.54	1.9058	9 51 43.1	9.960
10	1 3 29.45	1.8885	1 27 28.2	11.246	10	2 34 12.92	1.9070	10 1 39.4	9.917
11	1 5 22.74	1.8879	1 38 42.6	11.234	11	2 36 7.38	1.9083	10 11 33.1	9.873
12	1 7 16.00	1.8873	1 49 56.3	11.222	12	2 38 1.92	1.9097	10 21 24.2	9.829
13	1 9 9.22	1.8867	2 1 9.3	11.210	13	2 39 56.54	1.9110	10 31 12.6	9.783
14	1 11 2.41	1.8863	2 12 21.5	11.196	14	2 41 51.24	1.9124	10 40 58.2	9.737
15	1 12 55.58	1.8860	2 23 32.8	11.181	15	2 43 46.03	1.9137	10 50 41.0	9.690
16	1 14 48.73	1.8857	2 34 43.2	11.166	16	2 45 40.91	1.9153	11 0 21.0	9.642
17	1 16 41.86	1.8853	2 45 52.7	11.151	17	2 47 35.88	1.9168	11 9 58.1	9.594
18	1 18 34.97	1.8850	2 57 1.3	11.135	18	2 49 30.93	1.9183	11 19 32.3	9.546
19	1 20 28.06	1.8848	3 8 8.9	11.117	19	2 51 26.08	1.9199	11 29 3.6	9.497
20	1 22 21.14	1.8846	3 19 15.4	11.099	20	2 53 21.32	1.9215	11 38 32.0	9.448
21	1 24 14.21	1.8844	3 30 20.8	11.081	21	2 55 16.66	1.9232	11 47 57.4	9.397
22	1 26 7.27	1.8843	3 41 25.1	11.062	22	2 57 12.10	1.9247	11 57 19.7	9.346
23	1 28 0.32	1.8842	3 52 28.2	11.042	23	2 59 7.63	1.9263	12 6 38.9	9.294
24	1 29 53.37	1.8842	N. 4° 3' 30.1	11.022	24	3 1 3.26	1.9280	N. 12° 15' 55.0	9.242

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 21.					TUESDAY 23.				
0	3 1 3.26	1.9980	N.12 15 55.0	9.949	0	4 35 57.30	2.0318	N.18 27 39.0	6.092
1	3 2 58.99	1.9986	12 25 8.0	9.180	1	4 37 59.28	2.0342	18 33 37.9	5.941
2	3 4 54.83	1.9316	12 34 17.7	9.135	2	4 40 1.40	2.0365	18 39 31.9	5.890
3	3 6 50.78	1.9334	12 43 24.2	9.081	3	4 42 3.66	2.0389	18 45 21.0	5.777
4	3 8 46.84	1.9354	12 52 27.4	9.026	4	4 44 6.07	2.0413	18 51 5.2	5.695
5	3 10 43.00	1.9369	13 1 27.3	8.971	5	4 46 8.62	2.0437	18 56 44.4	5.612
6	3 12 39.27	1.9388	13 10 23.9	8.915	6	4 48 11.31	2.0461	19 2 18.6	5.568
7	3 14 35.65	1.9407	13 19 17.1	8.858	7	4 50 14.15	2.0485	19 7 47.8	5.444
8	3 16 32.15	1.9426	13 28 6.8	8.800	8	4 52 17.13	2.0509	19 13 11.9	5.360
9	3 18 28.76	1.9445	13 36 53.1	8.742	9	4 54 20.26	2.0533	19 18 31.0	5.275
10	3 20 25.49	1.9465	13 45 35.9	8.684	10	4 56 23.53	2.0557	19 23 44.9	5.189
11	3 22 22.34	1.9484	13 54 15.2	8.625	11	4 58 26.94	2.0580	19 28 53.7	5.103
12	3 24 19.30	1.9503	14 2 50.9	8.565	12	5 0 30.49	2.0603	19 33 57.3	5.016
13	3 26 16.38	1.9523	14 11 23.0	8.505	13	5 2 34.18	2.0627	19 38 55.7	4.929
14	3 28 13.58	1.9544	14 19 51.5	8.444	14	5 4 38.01	2.0651	19 43 48.8	4.842
15	3 30 10.91	1.9565	14 28 16.3	8.382	15	5 6 41.99	2.0675	19 48 36.7	4.754
16	3 32 8.36	1.9585	14 36 37.4	8.320	16	5 8 46.11	2.0698	19 53 19.3	4.666
17	3 34 5.93	1.9606	14 44 54.7	8.257	17	5 10 50.37	2.0722	19 57 56.6	4.577
18	3 36 3.63	1.9627	14 53 8.2	8.193	18	5 12 54.77	2.0745	20 2 28.5	4.487
19	3 38 1.46	1.9648	15 1 17.9	8.129	19	5 14 59.31	2.0768	20 6 55.0	4.397
20	3 39 59.41	1.9669	15 9 23.7	8.065	20	5 17 3.98	2.0790	20 11 16.1	4.307
21	3 41 57.49	1.9691	15 17 25.7	8.001	21	5 19 8.79	2.0813	20 15 31.8	4.216
22	3 43 55.70	1.9713	15 25 23.8	7.935	22	5 21 13.74	2.0836	20 19 42.0	4.125
23	3 45 54.04	1.9735	N.15 33 17.9	7.868	23	5 23 18.82	2.0858	N.20 23 46.8	4.034
MONDAY 22.					WEDNESDAY 24.				
0	3 47 52.52	1.9757	N.15 41 7.9	7.800	0	5 25 24.04	2.0881	N.20 27 46.1	3.942
1	3 49 51.13	1.9779	15 48 53.9	7.739	1	5 27 29.39	2.0903	20 31 39.8	3.849
2	3 51 49.87	1.9801	15 56 35.8	7.684	2	5 29 34.88	2.0926	20 35 27.9	3.756
3	3 53 48.74	1.9823	16 4 13.6	7.596	3	5 31 40.50	2.0948	20 39 10.5	3.662
4	3 55 47.75	1.9846	16 11 47.3	7.507	4	5 33 46.25	2.0969	20 42 47.4	3.568
5	3 57 46.90	1.9869	16 19 16.9	7.458	5	5 35 52.13	2.0991	20 46 18.7	3.474
6	3 59 46.18	1.9892	16 26 42.3	7.387	6	5 37 58.14	2.1012	20 49 44.3	3.379
7	4 1 45.60	1.9915	16 34 3.4	7.316	7	5 40 4.28	2.1034	20 53 4.2	3.284
8	4 3 45.16	1.9938	16 41 20.2	7.244	8	5 42 10.55	2.1056	20 56 18.4	3.188
9	4 5 44.86	1.9962	16 48 32.6	7.171	9	5 44 16.95	2.1077	20 59 26.8	3.093
10	4 7 44.70	1.9985	16 55 40.7	7.099	10	5 46 23.47	2.1097	21 2 29.5	2.998
11	4 9 44.68	2.0008	17 2 44.4	7.026	11	5 48 30.11	2.1117	21 5 26.5	2.902
12	4 11 44.79	2.0031	17 9 43.8	6.952	12	5 50 36.88	2.1138	21 8 17.7	2.804
13	4 13 45.05	2.0055	17 16 38.7	6.877	13	5 52 43.77	2.1158	21 11 3.0	2.706
14	4 15 45.45	2.0078	17 23 29.1	6.802	14	5 54 50.78	2.1178	21 13 42.4	2.609
15	4 17 45.99	2.0102	17 30 15.0	6.727	15	5 56 57.91	2.1198	21 16 16.0	2.511
16	4 19 46.67	2.0126	17 36 56.3	6.650	16	5 59 5.16	2.1218	21 18 43.7	2.412
17	4 21 47.50	2.0150	17 43 33.0	6.573	17	6 1 12.53	2.1237	21 21 5.4	2.312
18	4 23 48.47	2.0173	17 50 5.1	6.496	18	6 3 20.01	2.1257	21 23 21.2	2.213
19	4 25 49.58	2.0197	17 56 32.5	6.419	19	6 5 27.61	2.1276	21 25 31.0	2.114
20	4 27 50.84	2.0221	18 2 55.3	6.341	20	6 7 35.32	2.1294	21 27 34.9	2.015
21	4 29 52.24	2.0245	18 9 13.4	6.262	21	6 9 43.14	2.1312	21 29 32.8	1.915
22	4 31 53.78	2.0269	18 15 26.7	6.182	22	6 11 51.07	2.1331	21 31 24.7	1.814
23	4 33 55.47	2.0293	18 21 35.2	6.102	23	6 13 59.11	2.1349	21 33 10.5	1.713
24	4 35 57.30	2.0318	N.18 27 39.0	6.022	24	6 16 7.26	2.1367	N.21 34 50.3	1.612

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 25.					SATURDAY 27.				
0	6 16 7.26	2.1367	N.21° 34' 50.3	1.619	0	8 0 12.38	2.1894	N.20° 51' 29.9	3.470
1	6 18 15.51	2.1384	21 36 24.0	1.511	1	8 2 23.76	2.1898	20 47 58.5	3.578
2	6 20 23.87	2.1401	21 37 51.6	1.409	2	8 4 35.16	2.1909	20 44 20.6	3.686
3	6 22 32.33	2.1418	21 39 13.1	1.307	3	8 6 46.58	2.1906	20 40 36.2	3.793
4	6 24 40.89	2.1435	21 40 28.5	1.205	4	8 8 58.03	2.1910	20 36 45.4	3.901
5	6 26 49.55	2.1459	21 41 37.7	1.102	5	8 11 9.50	2.1913	20 32 48.1	4.008
6	6 28 58.31	2.1468	21 42 40.8	1.000	6	8 13 20.98	2.1915	20 28 44.4	4.115
7	6 31 7.17	2.1484	21 43 37.7	0.897	7	8 15 32.48	2.1918	20 24 34.3	4.222
8	6 33 16.12	2.1499	21 44 28.4	0.793	8	8 17 44.00	2.1921	20 20 17.7	4.330
9	6 35 25.16	2.1515	21 45 12.9	0.690	9	8 19 55.54	2.1924	20 15 54.7	4.437
10	6 37 34.30	2.1530	21 45 51.2	0.586	10	8 22 7.09	2.1926	20 11 25.3	4.543
11	6 39 43.52	2.1544	21 46 23.2	0.489	11	8 24 18.65	2.1927	20 6 49.5	4.650
12	6 41 52.83	2.1559	21 46 49.0	0.378	12	8 26 30.22	2.1929	20 2 7.3	4.757
13	6 44 2.23	2.1573	21 47 8.5	0.273	13	8 28 41.80	2.1931	19 57 18.7	4.863
14	6 46 11.71	2.1588	21 47 21.7	0.169	14	8 30 53.39	2.1933	19 52 23.7	4.969
15	6 48 21.28	2.1602	21 47 28.7	+ 0.064	15	8 33 5.00	2.1935	19 47 22.4	5.075
16	6 50 30.93	2.1615	21 47 29.4	- 0.042	16	8 35 16.61	2.1936	19 42 14.7	5.181
17	6 52 40.66	2.1628	21 47 23.7	0.148	17	8 37 28.23	2.1937	19 37 0.7	5.287
18	6 54 50.47	2.1641	21 47 11.6	0.254	18	8 39 39.85	2.1937	19 31 40.3	5.393
19	6 57 0.35	2.1653	21 46 53.2	0.359	19	8 41 51.48	2.1938	19 26 13.6	5.498
20	6 59 10.31	2.1666	21 46 28.5	0.464	20	8 44 3.11	2.1938	19 20 40.6	5.604
21	7 1 20.34	2.1678	21 45 57.5	0.570	21	8 46 14.74	2.1938	19 15 1.2	5.709
22	7 3 30.44	2.1689	21 45 20.1	0.677	22	8 48 26.37	2.1938	19 9 15.5	5.813
23	7 5 40.61	2.1701	N.21 44 36.3	0.783	23	8 50 38.00	2.1939	N.19 3 23.6	5.917
FRIDAY 26.					SUNDAY 28.				
0	7 7 50.85	2.1719	N.21 43 46.1	0.890	0	8 52 49.64	2.1940	N.18 57 25.5	6.021
1	7 10 1.16	2.1733	21 42 49.5	0.997	1	8 55 1.28	2.1939	18 51 21.1	6.125
2	7 12 11.53	2.1733	21 41 46.5	1.103	2	8 57 12.91	2.1938	18 45 10.5	6.229
3	7 14 21.96	2.1743	21 40 37.1	1.210	3	8 59 24.54	2.1938	18 38 53.6	6.333
4	7 16 32.45	2.1753	21 39 21.3	1.317	4	9 1 36.17	2.1938	18 32 30.5	6.436
5	7 18 43.00	2.1763	21 37 59.1	1.424	5	9 3 47.80	2.1937	18 26 1.3	6.538
6	7 20 53.61	2.1772	21 36 30.4	1.532	6	9 5 59.42	2.1937	18 19 26.0	6.640
7	7 23 4.27	2.1782	21 34 55.3	1.639	7	9 8 11.04	2.1937	18 12 44.5	6.743
8	7 25 14.99	2.1791	21 33 13.7	1.747	8	9 10 22.66	2.1936	18 5 56.8	6.846
9	7 27 25.76	2.1799	21 31 25.7	1.854	9	9 12 34.27	2.1935	17 59 3.0	6.947
10	7 29 36.58	2.1807	21 29 31.2	1.962	10	9 14 45.88	2.1934	17 52 3.2	7.047
11	7 31 47.45	2.1815	21 27 30.3	2.069	11	9 16 57.48	2.1933	17 44 57.4	7.148
12	7 33 58.36	2.1822	21 25 22.9	2.177	12	9 19 9.07	2.1933	17 37 45.5	7.248
13	7 36 9.31	2.1829	21 23 9.0	2.285	13	9 21 20.66	2.1931	17 30 27.6	7.348
14	7 38 20.31	2.1837	21 20 48.7	2.393	14	9 23 32.24	2.1930	17 23 3.7	7.449
15	7 40 31.36	2.1845	21 18 21.9	2.501	15	9 25 43.82	2.1929	17 15 33.7	7.549
16	7 42 42.45	2.1851	21 15 48.6	2.608	16	9 27 55.39	2.1928	17 7 57.8	7.648
17	7 44 53.57	2.1857	21 13 8.9	2.716	17	9 30 6.96	2.1927	17 0 16.0	7.746
18	7 47 4.73	2.1863	21 10 22.7	2.823	18	9 32 18.52	2.1927	16 52 28.3	7.844
19	7 49 15.93	2.1869	21 7 30.1	2.931	19	9 34 30.08	2.1926	16 44 34.7	7.942
20	7 51 27.16	2.1874	21 4 31.0	3.039	20	9 36 41.63	2.1924	16 36 35.3	8.039
21	7 53 38.42	2.1879	21 1 25.4	3.147	21	9 38 53.17	2.1923	16 28 30.1	8.136
22	7 55 49.71	2.1884	20 58 13.4	3.254	22	9 41 4.71	2.1922	16 20 19.0	8.233
23	7 58 1.03	2.1889	20 54 54.9	3.362	23	9 43 16.24	2.1922	16 12 2.1	8.330
24	8 0 12.38	2.1894	N.20 51 29.9	3.470	24	9 45 27.77	2.1921	N.16 3 39.4	8.426

GREENWICH MEAN TIME.									
THE MOON'S RIGHT ASCENSION AND DECLINATION.									
Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 29.					WEDNESDAY 31.				
0	9 45 27.77	2.1991	N. 16° 3' 39".4	8.496	0	11 30 52.12	2.2087	N. 7° 40' 29".0	12.980
1	9 47 39.29	2.1990	15 55 11.0	8.590	1	11 33 4.68	2.2088	7 28 11.6	12.390
2	9 49 50.81	2.1990	15 46 37.0	8.614	2	11 35 17.30	2.2109	7 15 50.6	12.378
3	9 52 2.33	2.1919	15 37 57.3	8.708	3	11 37 29.90	2.2121	7 3 26.2	12.435
4	9 54 13.84	2.1918	15 29 12.0	8.802	4	11 39 42.75	2.2122	6 50 58.4	12.492
5	9 56 25.35	2.1918	15 20 21.1	8.895	5	11 41 55.58	2.2144	6 38 27.2	12.547
6	9 58 36.86	2.1918	15 11 24.6	8.988	6	11 44 8.48	2.2157	6 25 52.7	12.601
7	10 0 48.37	2.1917	15 2 22.5	9.081	7	11 46 21.46	2.2170	6 13 15.0	12.654
8	10 2 59.87	2.1917	14 53 14.9	9.173	8	11 48 34.52	2.2183	6 0 34.2	12.707
9	10 5 11.37	2.1917	14 44 1.9	9.262	9	11 50 47.65	2.2196	5 47 50.2	12.758
10	10 7 22.87	2.1917	14 34 43.5	9.352	10	11 53 0.87	2.2211	5 35 3.2	12.807
11	10 9 34.38	2.1918	14 25 19.7	9.442	11	11 55 14.18	2.2226	5 22 13.3	12.856
12	10 11 45.89	2.1918	14 15 50.5	9.531	12	11 57 27.58	2.2241	5 9 20.5	12.903
13	10 13 57.40	2.1918	14 6 16.0	9.620	13	11 59 41.07	2.2256	4 56 24.9	12.950
14	10 16 8.91	2.1919	13 56 36.1	9.709	14	12 1 54.65	2.2271	4 43 26.5	12.995
15	10 18 20.43	2.1921	13 46 50.9	9.797	15	12 4 8.32	2.2287	4 30 25.5	13.039
16	10 20 31.96	2.1922	13 37 0.5	9.883	16	12 6 22.09	2.2304	4 17 21.9	13.092
17	10 22 43.49	2.1923	13 27 5.0	9.969	17	12 8 35.97	2.2322	4 4 15.7	13.123
18	10 24 55.03	2.1924	13 17 4.3	10.054	18	12 10 49.95	2.2339	3 51 7.1	13.163
19	10 27 6.58	2.1926	13 6 58.5	10.139	19	12 13 4.04	2.2357	3 37 56.1	13.202
20	10 29 18.14	2.1928	12 56 47.6	10.223	20	12 15 18.24	2.2376	3 24 42.8	13.240
21	10 31 29.71	2.1930	12 46 31.7	10.307	21	12 17 32.55	2.2394	3 11 27.3	13.276
22	10 33 41.30	2.1932	12 36 10.8	10.389	22	12 19 46.97	2.2413	2 58 9.7	13.311
23	10 35 52.90	2.1934	N. 12° 25' 45.0	10.471	23	12 22 1.51	2.2433	N. 2° 44' 50.0	13.345
TUESDAY 30.					THURSDAY, NOVEMBER 1.				
0	10 38 4.51	2.1937	N. 12° 15' 14.3	10.559	0	12 24 16.17	2.2453	N. 2° 31' 28.3	13.377
1	10 40 16.14	2.1940	12 4 38.7	10.633					
2	10 42 27.79	2.1943	11 53 58.3	10.713					
3	10 44 39.46	2.1947	11 43 13.2	10.792					
4	10 46 51.15	2.1950	11 32 23.3	10.871					
5	10 49 2.86	2.1954	11 21 28.7	10.948					
6	10 51 14.60	2.1958	11 10 29.5	11.025					
7	10 53 26.36	2.1962	10 59 25.7	11.101					
8	10 55 38.15	2.1967	10 48 17.4	11.176					
9	10 57 49.97	2.1972	10 37 4.6	11.251					
10	11 0 1.82	2.1978	10 25 47.3	11.325					
11	11 2 13.71	2.1984	10 14 25.6	11.397					
12	11 4 25.63	2.1989	10 2 59.6	11.469					
13	11 6 37.58	2.1996	9 51 29.3	11.540					
14	11 8 49.58	2.2003	9 39 54.8	11.610					
15	11 11 1.62	2.2010	9 28 16.1	11.679					
16	11 13 13.70	2.2017	9 16 33.3	11.747					
17	11 15 25.83	2.2025	9 4 46.4	11.815					
18	11 17 38.00	2.2033	8 52 55.5	11.889					
19	11 19 50.22	2.2041	8 41 0.6	11.948					
20	11 22 2.49	2.2049	8 29 1.8	12.011					
21	11 24 14.81	2.2056	8 16 59.2	12.074					
22	11 26 27.19	2.2068	8 4 52.9	12.137					
23	11 28 39.63	2.2077	7 52 42.8	12.199					
24	11 30 52.12	2.2087	N. 7° 40' 29.0	12.260					
					PHASES OF THE MOON.				
					● New Moon.	Oct.	5 2 34.2		
					☾ First Quarter.		11 17 29.0		
					○ Full Moon.		19 9 9.0		
					☾ Last Quarter.		27 13 55.7		
					☾ Perigee.	Oct.	6 18.9		
					☾ Apogee.		22 10.2		

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Aldebaran	W.	67° 7' 7"	9597	68° 46' 6"	9579	70° 25' 30"	9561	72° 5' 10"	9543
	Pollux	W.	23 53 59	9800	25 28 27	9758	27 3 50	9791	28 40 2	9887
	SUN	E.	53 39 35	9857	52 8 28	9939	50 36 58	9990	49 5 5	9993
2	Aldebaran	W.	80 30 39	9453	82 12 58	9435	83 55 43	9417	85 38 53	9401
	Pollux	W.	36 51 39	9544	38 31 51	9590	40 12 37	9498	41 53 56	9473
	SUN	E.	41 19 59	9815	39 45 50	9798	38 11 20	9789	36 36 29	9787
3	Aldebaran	W.	94 20 51	9316	96 6 27	9300	97 52 26	9286	99 38 48	9269
	Pollux	W.	50 28 10	9371	52 12 27	9359	53 57 11	9334	55 42 21	9316
	SUN	E.	28 37 30	9703	27 0 54	9695	25 24 7	9689	23 47 12	9685
7	SUN	W.	26 50 27	9434	28 33 13	9499	30 16 7	9495	31 59 6	9494
	α Aquilæ	E.	78 9 4	9698	76 32 21	9711	74 55 56	9725	73 19 50	9749
	Fomalhaut	E.	111 32 0	9317	109 46 26	9313	108 0 46	9311	106 15 3	9311
8	SUN	W.	40 33 54	9435	42 16 39	9441	43 59 16	9446	45 41 45	9453
	VENUS	W.	17 11 29	9643	18 49 25	9694	20 27 48	9611	22 6 28	9604
	α Aquilæ	E.	65 25 50	9661	63 52 41	9693	62 20 13	9697	60 48 29	9695
	Fomalhaut	E.	97 26 40	9329	95 41 13	9398	93 55 54	9334	92 10 44	9348
9	SUN	W.	54 11 31	9496	55 52 50	9506	57 33 55	9516	59 14 46	9527
	VENUS	W.	30 20 52	9610	31 59 34	9615	33 38 8	9629	35 16 33	9630
	α Aquilæ	E.	53 23 11	9614	51 57 19	9679	50 32 43	9650	49 9 20	9697
	Fomalhaut	E.	83 27 58	9391	81 44 10	9403	80 0 40	9416	78 17 28	9430
	α Pegasi	E.	99 19 13	9551	97 39 10	9558	95 59 17	9566	94 19 35	9575
10	SUN	W.	67 35 1	9587	69 14 14	9600	70 53 9	9613	72 31 46	9626
	VENUS	W.	43 25 32	9681	45 2 37	9693	46 39 26	9705	48 15 59	9718
	JUPITER	W.	20 33 12	9379	22 17 27	9376	24 1 36	9389	25 45 37	9389
	Fomalhaut	E.	69 46 47	9519	68 5 50	9530	66 25 19	9550	64 45 15	9570
	α Pegasi	E.	86 4 40	9635	84 26 32	9649	82 48 44	9665	81 11 17	9681
11	SUN	W.	80 40 18	9695	82 17 5	9708	83 53 34	9722	85 29 44	9737
	VENUS	W.	56 14 30	9783	57 49 20	9797	59 23 52	9810	60 58 7	9824
	JUPITER	W.	34 22 35	9439	36 5 14	9450	37 47 37	9469	39 29 44	9474
	MARS	W.	18 15 11	9791	19 51 23	9715	21 27 43	9713	23 4 6	9714
	Fomalhaut	E.	56 32 24	9689	54 55 29	9716	53 19 11	9746	51 43 32	9776
	α Pegasi	E.	73 9 50	9775	71 34 50	9797	70 0 18	9890	68 26 16	9843
12	SUN	W.	93 25 56	9807	95 0 15	9890	96 34 17	9834	98 8 1	9848
	VENUS	W.	68 44 55	9893	70 17 23	9906	71 49 34	9920	73 21 27	9934
	JUPITER	W.	47 56 5	9534	49 36 31	9547	51 16 39	9559	52 56 30	9573
	Antares	W.	45 2 27	9551	46 42 30	9559	48 22 22	9566	50 2 3	9575
	MARS	W.	31 4 41	9747	32 40 19	9756	34 15 45	9766	35 50 58	9776
	Fomalhaut	E.	43 56 9	9864	42 25 11	9910	40 55 11	9961	39 26 14	9917
	α Pegasi	E.	60 44 8	9979	59 13 29	9910	57 43 29	9943	56 14 10	9979
13	SUN	W.	105 52 15	9915	107 24 15	9998	108 55 58	9949	110 27 24	9955
	VENUS	W.	80 56 39	9900	82 26 52	9914	83 56 48	9926	85 26 28	9939
	JUPITER	W.	61 11 34	9639	62 49 45	9643	64 27 41	9655	66 5 31	9667
	Antares	W.	58 17 22	9629	59 55 47	9639	61 33 58	9649	63 11 56	9659

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Dist.	XVh.	P. L. of Dist.	XVIIIh.	P. L. of Dist.	XXIh.	P. L. of Dist.
1	Aldebaran W.	73° 45' 33"	2525	75° 26' 12"	2507	77° 7' 16"	2489	78° 48' 45"	2471
	Pollux W.	30 17 0	2655	31 54 41	2635	33 33 2	2596	35 12 2	2569
	Sun E.	47 32 50	2685	46 0 12	2666	44 27 10	2649	42 53 46	2631
2	Aldebaran W.	87 22 27	2383	89 6 26	2366	90 50 50	2349	92 35 38	2332
	Pollux W.	43 35 47	2451	45 18 9	2430	47 1 1	2410	48 44 21	2390
	Sun E.	35 1 18	2752	33 25 47	2738	31 49 58	2725	30 13 52	2713
3	Aldebaran W.	101 25 33	2254	103 12 40	2240	105 0 8	2226	106 47 57	2212
	Pollux W.	57 27 57	2300	59 13 57	2283	61 0 21	2268	62 47 8	2253
	Sun E.	22 10 12	2685	20 33 12	2669	18 56 18	2701	17 19 39	2722
7	Sun W.	33 42 7	2424	35 25 8	2425	37 8 7	2427	38 51 3	2431
	α Aquilæ E.	71 44 6	2761	70 8 47	2739	68 33 56	2806	66 59 36	2839
	Fomalhaut E.	104 29 19	2311	102 43 35	2312	100 57 53	2314	99 12 14	2317
8	Sun W.	47 24 5	2460	49 6 14	2468	50 48 12	2477	52 29 58	2486
	Venus W.	23 45 18	2600	25 24 13	2599	27 3 9	2601	28 42 3	2604
	α Aquilæ E.	59 17 33	3007	57 47 29	3052	56 18 21	3101	54 50 13	3156
	Fomalhaut E.	90 25 45	2349	88 40 57	2352	86 56 22	2368	85 12 2	2380
9	Sun W.	60 55 22	2538	62 35 42	2551	64 15 45	2563	65 55 31	2574
	Venus W.	36 54 47	2639	38 32 49	2649	40 10 38	2660	41 48 12	2670
	α Aquilæ E.	47 47 43	3511	46 27 31	3604	45 9 1	3707	43 52 21	3809
	Fomalhaut E.	76 34 36	2445	74 52 5	2460	73 9 56	2477	71 28 10	2493
	α Pegasi E.	92 40 6	2585	91 0 51	2596	89 21 51	2608	87 43 7	2621
10	Sun W.	74 10 5	2640	75 48 6	2654	77 25 48	2667	79 3 12	2681
	Venus W.	49 52 15	2730	51 28 15	2743	53 3 58	2756	54 39 23	2770
	Jupiter W.	27 29 27	2398	29 13 5	2407	30 56 30	2417	32 39 40	2428
	Fomalhaut E.	63 5 39	2591	61 26 32	2614	59 47 56	2638	58 9 53	2663
	α Pegasi E.	79 34 11	2698	77 57 28	2716	76 21 10	2735	74 45 17	2755
11	Sun W.	87 5 35	2750	88 41 8	2764	90 16 23	2779	91 51 19	2793
	Venus W.	62 32 4	2838	64 5 43	2851	65 39 5	2865	67 12 9	2879
	Jupiter W.	41 11 34	2486	42 53 7	2498	44 34 23	2510	46 15 22	2522
	Mars W.	24 40 27	2718	26 16 43	2723	27 52 52	2730	29 28 52	2738
	Fomalhaut E.	50 8 33	2808	48 34 16	2843	47 0 44	2861	45 28 1	2891
	α Pegasi E.	66 52 44	2868	65 19 44	2894	63 47 17	2921	62 15 25	2949
12	Sun W.	99 41 27	2892	101 14 35	2875	102 47 26	2889	104 19 59	2902
	Venus W.	74 53 3	2947	76 24 22	2961	77 55 24	2973	79 26 10	2987
	Jupiter W.	54 36 4	2583	56 15 22	2596	57 54 23	2608	59 33 7	2621
	Antares W.	51 41 32	2584	53 20 49	2593	54 59 53	2603	56 38 44	2612
	Mars W.	37 25 57	2787	39 0 42	2797	40 35 14	2808	42 9 32	2819
	Fomalhaut E.	37 58 25	3178	36 31 50	3246	35 6 35	3321	33 42 48	3405
	α Pegasi E.	54 45 35	3116	53 17 45	3156	51 50 42	3198	50 24 30	3243
13	Sun W.	111 58 33	2968	113 29 26	2980	115 0 4	2993	116 30 26	3005
	Venus W.	86 55 53	3051	88 25 3	3064	89 53 57	3077	91 22 35	3089
	Jupiter W.	67 42 45	2679	69 19 53	2689	70 56 47	2701	72 33 26	2719
	Antares W.	64 49 40	2692	66 27 11	2679	68 4 29	2681	69 41 34	2692

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Dif.	IIIh.	P. L. of Dif.	VIh.	P. L. of Dif.	IXh.	P. L. of Dif.
13	MARS	W.	43 43 35	2830	45 17 24	2841	46 50 59	2852	48 24 19	2863
	α Pegasi	E.	48 50 12	3291	47 34 50	3343	46 11 28	3399	44 49 10	3460
	α Arietis	E.	89 48 26	2709	88 11 58	2721	86 35 46	2733	84 59 50	2746
14	SUN	W.	118 0 32	3018	119 30 23	3030	120 59 58	3043	122 29 18	3054
	VENUS	W.	92 50 58	3101	94 19 7	3113	95 47 1	3124	97 14 41	3136
	JUPITER	W.	74 9 50	2723	75 45 59	2734	77 21 54	2744	78 57 35	2755
	Antares	W.	71 18 25	2701	72 55 3	2711	74 31 28	2721	76 7 40	2731
	MARS	W.	56 7 27	2918	57 39 23	2928	59 11 6	2939	60 42 35	2950
	α Arietis	E.	77 4 19	2809	75 30 3	2822	73 56 4	2835	72 22 22	2848
	Aldebaran	E.	108 20 11	2852	106 42 27	2863	105 4 58	2875	103 27 44	2886
15	JUPITER	W.	86 52 35	2805	88 26 56	2815	90 1 4	2825	91 35 0	2834
	Antares	W.	84 5 28	2778	85 40 25	2788	87 15 9	2797	88 49 41	2806
	MARS	W.	68 16 45	3001	69 46 57	3010	71 16 57	3020	72 46 45	3029
	α Aquilæ	W.	44 41 34	4155	45 50 43	4088	47 0 56	4099	48 12 7	3075
	α Arietis	E.	64 38 14	2919	63 6 19	2933	61 34 42	2948	60 3 24	2964
	Aldebaran	E.	95 24 56	2734	93 49 1	2744	92 13 19	2753	90 37 50	2763
16	JUPITER	W.	99 21 41	2880	100 54 26	2887	102 27 1	2896	103 59 25	2905
	Antares	W.	96 39 24	2851	98 12 46	2859	99 45 57	2868	101 18 57	2876
	MARS	W.	80 12 53	3075	81 41 33	3083	83 10 3	3092	84 38 22	3101
	α Aquilæ	W.	54 19 44	3781	55 35 6	3753	56 50 57	3727	58 7 15	3705
	α Arietis	E.	52 32 2	3061	51 2 52	3070	49 34 6	3080	48 5 44	3111
	Aldebaran	E.	82 43 21	2898	81 9 1	2915	79 34 52	2923	78 0 54	2931
17	MARS	W.	91 57 22	3142	93 24 41	3150	94 51 50	3158	96 18 50	3166
	α Aquilæ	E.	64 33 52	2896	65 51 58	2915	67 10 16	2906	68 28 44	2906
	α Arietis	E.	40 51 2	3944	39 25 45	3976	38 1 6	3313	36 37 9	3358
	Aldebaran	E.	70 13 39	2870	68 40 42	2878	67 7 55	2885	65 35 17	2893
18	α Aquilæ	W.	75 2 47	3676	76 21 48	3674	77 40 51	3673	78 59 55	3673
	Fomalhaut	W.	40 6 35	3483	41 27 18	3456	42 48 31	3434	44 10 9	3414
	Aldebaran	E.	57 54 25	2927	56 22 41	2934	54 51 5	2941	53 19 38	2947
	Pollux	E.	102 3 1	2958	100 31 56	2965	99 0 59	2971	97 30 10	2977
19	α Aquilæ	W.	85 35 1	3583	86 53 54	3587	88 12 42	3592	89 31 25	3598
	Fomalhaut	W.	51 3 13	3345	52 26 33	3335	53 50 4	3327	55 13 44	3320
	α Pegasi	W.	38 33 49	4082	39 44 8	4090	40 55 28	3984	42 7 43	3914
	Aldebaran	E.	45 44 23	2978	44 13 43	2985	42 43 11	2990	41 12 46	2997
	Pollux	E.	89 57 59	3007	88 27 55	3013	86 57 58	3018	85 28 8	3024
20	Fomalhaut	W.	62 13 42	3699	63 37 55	3696	65 2 11	3694	66 26 29	3693
	α Pegasi	W.	48 20 6	3731	49 36 20	3705	50 53 2	3681	52 10 9	3660
	Aldebaran	E.	33 42 30	3054	32 12 47	3030	30 43 11	3035	29 13 42	3041
	Pollux	E.	78 0 42	3052	76 31 33	3056	75 2 30	3061	73 33 33	3066
21	Fomalhaut	W.	73 28 22	3289	74 52 46	3289	76 17 10	3289	77 41 34	3290
	α Pegasi	W.	58 40 50	3579	59 59 47	3566	61 18 58	3555	62 38 21	3545
	Pollux	E.	66 10 18	3090	64 41 56	3094	63 13 39	3089	61 45 28	3103
	SATURN	E.	92 34 45	3077	91 6 7	3081	89 37 34	3084	88 9 5	3087
	Regulus	E.	101 54 35	3054	100 25 29	3058	98 56 28	3061	97 27 31	3064

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Dist.	XVh.	P. L. of Dist.	XVIIIh.	P. L. of Dist.	XXIh.	P. L. of Dist.
13	MARS	W.	49° 57' 25"	9874	51° 30' 17"	9898	53° 2' 54"	9897	54° 35' 17"	9937
	α Pegasi	E.	43 28 1	9598	42 8 6	9598	40 49 29	9676	39 32 16	9763
	α Arietis	E.	83 24 11	9758	81 48 48	9771	80 13 42	9783	78 38 52	9798
14	SUN	W.	123 58 24	3068	125 27 15	3078	126 55 51	3090	128 24 13	3108
	VENUS	W.	98 42 7	3148	100 9 19	3158	101 36 18	3169	103 3 4	3181
	JUPITER	W.	80 33 2	9765	82 8 16	9775	83 43 16	9788	85 18 2	9798
	Antares	W.	77 43 39	9741	79 19 25	9750	80 54 58	9760	82 30 19	9769
	MARS	W.	62 13 51	9900	63 44 54	9970	65 15 44	9981	66 46 21	9991
	α Arietis	E.	70 48 57	9892	69 15 50	9876	67 43 0	9890	66 10 28	9904
	Aldebaran	E.	101 50 44	9695	100 13 57	9704	98 37 23	9715	97 1 3	9735
15	JUPITER	W.	93 8 44	9843	94 42 16	9852	96 15 36	9863	97 48 44	9870
	Antares	W.	90 24 1	9815	91 58 9	9894	93 32 6	9833	95 5 51	9849
	MARS	W.	74 16 22	3039	75 45 47	3048	77 15 0	3057	78 44 2	3068
	α Aquilæ	W.	49 24 11	3997	50 37 3	3984	51 50 39	3946	53 4 54	3912
	α Arietis	E.	58 32 26	9980	57 1 48	9997	55 31 31	3014	54 1 35	3039
	Aldebaran	E.	89 2 33	9779	87 27 28	9780	85 52 34	9789	84 17 52	9798
16	JUPITER	W.	105 31 38	9913	107 3 40	9921	108 35 32	9929	110 7 14	9937
	Antares	W.	102 51 46	9895	104 24 24	9894	105 56 51	9909	107 29 7	9910
	MARS	W.	86 6 30	3110	87 34 28	3118	89 2 16	3198	90 29 54	3194
	α Aquilæ	W.	59 23 57	3685	60 41 0	3668	61 58 21	3659	63 15 59	3638
	α Arietis	E.	46 37 48	3134	45 10 20	3159	43 43 22	3185	42 16 55	3214
	Aldebaran	E.	76 27 7	9639	74 53 30	9647	73 20 3	9655	71 46 46	9669
17	MARS	W.	97 45 40	3173	99 12 21	3181	100 38 53	3188	102 5 16	3195
	α Aquilæ	W.	69 47 20	3691	71 6 4	3688	72 24 54	3681	73 43 49	3678
	α Arietis	E.	35 13 58	3398	33 51 37	3445	32 30 11	3498	31 9 45	3559
	Aldebaran	E.	64 2 49	9600	62 30 30	9607	60 58 20	9613	59 26 18	9620
18	α Aquilæ	W.	80 18 59	3574	81 38 2	3575	82 57 4	3576	84 16 4	3579
	Fomalhaut	W.	45 32 10	3396	46 54 31	3399	48 17 10	3398	49 40 5	3355
	Aldebaran	E.	51 48 19	9654	50 17 8	9660	48 46 5	9668	47 15 10	9673
	Pollux	E.	95 59 29	9983	94 28 55	9980	92 58 29	9985	91 28 10	9991
19	α Aquilæ	W.	90 50 2	3604	92 8 32	3610	93 26 55	3617	94 45 11	3624
	Fomalhaut	W.	56 37 32	3314	58 1 27	3319	59 25 27	3306	60 49 32	3301
	α Pegasi	W.	43 20 49	3689	44 34 40	3699	45 49 12	3799	47 4 22	3760
	Aldebaran	E.	39 42 29	3009	38 12 19	3008	36 42 16	3014	35 12 20	3018
	Pollux	E.	83 58 25	3030	82 28 49	3035	80 59 20	3041	79 29 58	3046
20	Fomalhaut	W.	67 50 49	3691	69 15 11	3690	70 39 34	3689	72 3 58	3689
	α Pegasi	W.	53 27 39	3640	54 45 30	3693	56 3 40	3697	57 22 7	3699
	Aldebaran	E.	27 44 20	3046	26 15 4	3051	24 45 54	3056	23 16 51	3061
	Pollux	E.	72 4 42	3071	70 35 57	3078	69 7 18	3081	67 38 45	3086
21	Fomalhaut	W.	79 5 57	3690	80 30 20	3691	81 54 42	3692	83 19 3	3693
	α Pegasi	W.	63 57 55	3536	65 17 39	3598	66 37 32	3599	67 57 34	3613
	Pollux	E.	60 17 22	3107	58 49 21	3116	57 21 24	3114	55 53 32	3119
	SATURN	E.	86 40 39	3090	85 12 17	3099	83 43 58	3095	82 15 42	3096
	Regulus	E.	95 58 37	3057	94 29 47	3060	93 1 0	3079	91 32 16	3074



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Dist.	IIIh.	P. L. of Dist.	VIh.	P. L. of Dist.	IXh.	P. L. of Dist.
22	Fomalhaut W.	84° 43' 24"	3993	86° 7' 44"	3994	87° 32' 2"	3995	88° 56' 19"	3996
	α Pegasi W.	69 17 44	3506	70 38 1	3501	71 58 24	3495	73 18 54	3490
	α Arietis W.	26 12 38	3994	27 25 33	3944	28 39 50	3775	29 55 18	3716
	Pollux E.	54 25 45	3193	52 58 3	3196	51 30 25	3199	50 2 51	3133
	SATURN E.	80 47 28	3099	79 19 17	3101	77 51 8	3102	76 23 1	3103
	Regulus E.	90 3 35	3076	88 34 56	3078	87 6 19	3079	85 37 44	3061
23	Fomalhaut W.	95 57 27	3301	97 21 37	3301	98 45 47	3309	100 9 56	3304
	α Pegasi W.	80 2 40	3469	81 23 39	3466	82 44 41	3463	84 5 47	3459
	α Arietis W.	36 25 54	3514	37 46 3	3485	39 6 44	3480	40 27 53	3436
	Pollux E.	42 46 7	3151	41 18 59	3155	39 51 56	3158	38 24 57	3163
	SATURN E.	69 2 39	3105	67 34 35	3104	66 6 30	3104	64 38 25	3103
	Regulus E.	78 15 6	3069	76 46 35	3069	75 18 3	3069	73 49 31	3061
24	α Arietis W.	47 19 40	3349	48 43 3	3397	50 6 43	3313	51 30 40	3296
	Pollux E.	31 11 33	3193	29 45 15	3009	28 19 8	3019	26 53 13	3094
	SATURN E.	57 17 29	3091	55 49 9	3088	54 20 45	3084	52 52 16	3080
	Regulus E.	66 26 23	3070	64 57 37	3067	63 28 47	3064	61 59 53	3060
	SUN E.	129 34 31	3477	128 13 41	3479	126 52 46	3468	125 31 46	3463
25	α Arietis W.	58 34 25	3933	59 59 55	3991	61 25 39	3999	62 51 38	3196
	Aldebaran W.	25 43 6	3040	27 12 29	3033	28 42 1	3096	30 11 42	3018
	SATURN E.	45 28 30	3055	43 59 25	3048	42 30 12	3048	41 0 51	3035
	Regulus E.	54 34 2	3035	53 4 33	3099	51 34 56	3099	50 5 11	3015
	SUN E.	118 45 11	3431	117 23 30	3493	116 1 40	3415	114 39 41	3406
26	α Arietis W.	70 5 13	3135	71 32 40	3192	73 0 23	3109	74 28 22	3096
	Aldebaran W.	37 42 44	2973	39 13 31	2969	40 44 31	2959	42 15 44	2949
	SATURN E.	33 31 44	2993	32 1 22	2983	30 30 48	2973	29 0 2	2964
	Regulus E.	42 34 7	2975	41 3 23	2966	39 32 28	2957	38 1 21	2946
	SUN E.	107 47 20	3360	106 24 18	3350	105 1 4	3338	103 37 37	3396
27	α Arietis W.	81 52 15	3030	83 21 51	3015	84 51 45	3001	86 21 57	2987
	Aldebaran W.	49 55 23	2931	51 28 6	2969	53 1 5	2955	54 34 22	2941
	Regulus E.	30 22 28	2999	28 49 59	2981	27 17 16	2969	25 44 18	2956
	SUN E.	96 36 47	3999	95 11 51	3947	93 46 38	3939	92 21 7	3918
28	Aldebaran W.	62 25 28	2766	64 0 41	2750	65 36 15	2734	67 12 10	2716
	Pollux W.	19 22 49	3048	20 52 2	2993	22 22 23	2946	23 53 44	2904
	SUN E.	85 8 58	3137	83 41 33	3119	82 13 47	3101	80 45 39	3084
29	Aldebaran W.	75 17 31	2639	76 55 46	2611	78 34 26	2593	80 13 31	2574
	Pollux W.	31 42 29	2739	33 18 17	2712	34 54 41	2685	36 31 41	2659
	SUN E.	73 19 27	2990	71 49 2	2971	70 18 13	2959	68 47 0	2939
30	Aldebaran W.	88 35 26	2490	90 17 8	2460	91 59 17	2441	93 41 53	2429
	Pollux W.	44 45 5	2540	46 25 22	2517	48 6 11	2495	49 47 31	2473
	SUN E.	61 4 35	2939	59 30 49	2912	57 56 37	2799	56 21 59	2773
31	Pollux W.	58 21 47	2369	60 6 7	2348	61 50 56	2329	63 36 13	2310
	Regulus W.	23 17 19	2349	24 2 7	2396	25 47 26	2307	27 33 16	2296
	SUN E.	48 22 23	2676	46 45 11	2658	45 7 35	2640	43 29 35	2623

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	Fomalhaut W.	90 20 35	3397	91 44 50	3398	93 9 4	3300	94 33 16	3300
	α Pegasi W.	74 39 29	3486	76 0 9	3480	77 20 55	3477	78 41 45	3479
	α Arietis W.	31 11 48	3665	32 29 12	3621	33 47 24	3580	35 6 20	3545
	Pollux E.	48 35 22	3137	47 7 57	3140	45 40 36	3143	44 13 19	3148
	SATURN E.	74 54 55	3104	73 26 50	3105	71 58 46	3105	70 30 42	3105
	Regulus E.	84 9 11	3082	82 40 39	3082	81 12 8	3082	79 43 37	3082
23	Fomalhaut W.	101 34 3	3305	102 58 9	3306	104 22 14	3306	105 46 18	3307
	α Pegasi W.	85 26 57	3456	86 48 10	3454	88 9 26	3451	89 30 45	3447
	α Arietis W.	41 49 29	3415	43 11 29	3394	44 33 52	3376	45 56 36	3358
	Pollux E.	36 58 4	3168	35 31 17	3173	34 4 35	3178	32 38 0	3185
	SATURN E.	63 10 19	3101	61 42 11	3099	60 14 0	3096	58 45 46	3094
	Regulus E.	72 20 58	3079	70 52 23	3078	69 23 46	3075	67 55 6	3073
24	α Arietis W.	52 54 54	3284	54 19 24	3271	55 44 9	3259	57 9 9	3245
	Pollux E.	25 27 32	3240	24 2 10	3259	22 37 10	3281	21 12 36	3309
	SATURN E.	51 23 42	3076	49 55 3	3071	48 26 18	3066	46 57 27	3061
	Regulus E.	60 30 54	3056	59 1 50	3051	57 32 40	3046	56 3 24	3041
	SUN E.	124 10 40	3457	122 49 28	3453	121 28 10	3445	120 6 44	3438
25	α Arietis W.	64 17 52	3184	65 44 20	3172	67 11 3	3159	68 38 1	3148
	Aldebaran W.	31 41 33	3009	33 11 34	3001	34 41 46	2992	36 12 9	2989
	SATURN E.	39 31 22	3027	38 1 43	3019	36 31 54	3011	35 1 55	3001
	Regulus E.	48 35 17	3008	47 5 14	3001	45 35 2	2993	44 4 40	2984
	SUN E.	113 17 34	3400	111 55 17	3390	110 32 49	3380	109 10 10	3371
26	α Arietis W.	75 56 36	3083	77 25 6	3069	78 53 53	3056	80 22 56	3043
	Aldebaran W.	43 47 10	2931	45 18 50	2919	46 50 45	2906	48 22 56	2894
	SATURN E.	27 29 4	2953	25 57 52	2942	24 26 26	2931	22 54 46	2920
	Regulus E.	36 30 1	2936	34 58 28	2926	33 26 42	2915	31 54 42	2904
	SUN E.	102 13 56	3314	100 50 1	3302	99 25 52	3288	98 1 27	3276
27	α Arietis W.	87 52 26	2973	89 23 13	2958	90 54 19	2943	92 25 43	2927
	Aldebaran W.	56 7 57	2926	57 41 51	2911	59 16 4	2797	60 50 36	2782
	Regulus E.	24 11 5	2846	22 37 37	2835	21 3 54	2824	19 29 57	2814
	SUN E.	90 55 19	3203	89 29 13	3187	88 2 48	3170	86 36 3	3153
28	Aldebaran W.	68 48 28	2899	70 25 9	2882	72 2 13	2865	73 39 40	2847
	Pollux W.	25 25 58	2886	26 59 1	2831	28 32 49	2798	30 7 19	2768
	SUN E.	79 17 10	3066	77 48 19	3047	76 19 5	3029	74 49 28	3009
29	Aldebaran W.	81 53 2	2555	83 32 59	2536	85 13 22	2517	86 54 11	2499
	Pollux W.	38 9 16	2635	39 47 24	2610	41 26 5	2586	43 5 19	2563
	SUN E.	67 15 22	2912	65 43 19	2892	64 10 50	2872	62 37 55	2852
30	Aldebaran W.	95 24 56	2403	97 8 26	2384	98 52 23	2365	100 36 48	2346
	Pollux W.	51 29 22	2451	53 11 44	2430	54 54 36	2410	56 37 57	2389
	SUN E.	54 46 56	2753	53 11 26	2734	51 35 31	2714	49 59 10	2695
31	Pollux W.	65 21 58	2291	67 8 11	2272	68 54 51	2254	70 41 58	2237
	Regulus W.	29 19 36	2987	31 6 24	2248	32 53 40	2230	34 41 23	2212
	SUN E.	41 51 11	2606	40 12 24	2590	38 33 15	2574	36 53 44	2559

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>
Thur.	1	14 28 25.46	9.824	S. 14 39 59.9	-47.71	16 9.98	67.02	16 20.43	0.031
Frid.	2	14 32 21.66	9.859	14 58 58.0	47.12	16 10.22	67.14	16 20.78	0.003
Sat.	3	14 36 18.68	9.893	15 17 41.4	46.50	16 10.46	67.26	16 20.31	0.037
SUN.	4	14 40 16.52	9.928	15 36 9.8	-45.86	16 10.70	67.38	16 19.02	0.072
Mon.	5	14 44 15.20	9.962	15 54 22.7	45.21	16 10.94	67.49	16 16.91	0.106
Tues.	6	14 48 14.71	9.997	16 12 19.7	44.54	16 11.18	67.61	16 13.97	0.141
Wed.	7	14 52 15.05	10.031	16 30 0.4	-43.84	16 11.42	67.73	16 10.20	0.175
Thur.	8	14 56 16.22	10.066	16 47 24.4	43.14	16 11.66	67.85	16 5.59	0.210
Frid.	9	15 0 18.23	10.100	17 4 31.2	42.42	16 11.90	67.97	16 0.15	0.244
Sat.	10	15 4 21.06	10.135	17 21 20.5	-41.68	16 12.13	68.09	15 53.89	0.279
SUN.	11	15 8 24.73	10.170	17 37 51.8	40.92	16 12.36	68.21	15 46.79	0.314
Mon.	12	15 12 29.24	10.206	17 54 4.6	40.14	16 12.58	68.33	15 38.86	0.349
Tues.	13	15 16 34.58	10.240	18 9 58.6	-39.35	16 12.80	68.45	15 30.10	0.383
Wed.	14	15 20 40.75	10.275	18 25 33.5	38.54	16 13.02	68.57	15 20.51	0.418
Thur.	15	15 24 47.75	10.309	18 40 48.9	37.72	16 13.24	68.69	15 10.10	0.452
Frid.	16	15 28 55.57	10.344	18 55 44.3	-36.89	16 13.45	68.81	14 58.86	0.487
Sat.	17	15 33 4.23	10.378	19 10 19.3	36.03	16 13.66	68.93	14 46.79	0.521
SUN.	18	15 37 13.72	10.413	19 24 33.6	35.16	16 13.86	69.04	14 33.89	0.556
Mon.	19	15 41 24.03	10.447	19 38 27.0	-34.28	16 14.06	69.15	14 20.17	0.590
Tues.	20	15 45 35.16	10.481	19 51 59.1	33.38	16 14.25	69.26	14 5.64	0.624
Wed.	21	15 49 47.11	10.515	20 5 9.4	32.46	16 14.44	69.37	13 50.29	0.658
Thur.	22	15 53 59.87	10.548	20 17 57.5	-31.53	16 14.62	69.48	13 34.14	0.691
Frid.	23	15 58 13.42	10.581	20 30 23.2	30.59	16 14.80	69.59	13 17.18	0.724
Sat.	24	16 2 27.76	10.614	20 42 26.2	29.64	16 14.97	69.70	12 59.43	0.757
SUN.	25	16 6 42.89	10.647	20 54 6.2	-28.67	16 15.14	69.80	12 40.91	0.789
Mon.	26	16 10 58.78	10.678	21 5 22.8	27.69	16 15.30	69.90	12 21.63	0.820
Tues.	27	16 15 15.42	10.708	21 16 15.6	26.70	16 15.46	69.99	12 1.60	0.850
Wed.	28	16 19 32.79	10.738	21 26 44.3	-25.69	16 15.62	70.09	11 40.85	0.880
Thur.	29	16 23 50.87	10.767	21 36 48.6	24.67	16 15.78	70.18	11 19.39	0.909
Frid.	30	16 28 9.63	10.795	21 46 28.3	23.63	16 15.93	70.27	10 57.25	0.937
Sat.	31	16 32 29.06	10.822	S. 21 55 43.0	-22.58	16 16.08	70.36	10 34.44	0.964

NOTE.—The mean time of semidiameter passing may be found by subtracting 0<sup>h</sup>.19 from the sideral time.  
The sign — prefixed to the hourly change of declination indicates that south declinations are increasing.

AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.			
Thur.	1	14 <sup>h</sup> 28 <sup>m</sup> 26.13 <sup>s</sup>	9.895	S. 14° 40' 12.9"	-47.71	16 <sup>m</sup> 20.44 <sup>s</sup>	0.031	14 <sup>h</sup> 44 <sup>m</sup> 48.56 <sup>s</sup>
Frid.	2	14 32 24.34	9.859	14 59 10.8	47.11	16 20.78	0.003	14 48 45.12
Sat.	3	14 36 21.37	9.893	15 17 54.1	46.49	16 20.30	0.037	14 52 41.67
SUN.	4	14 40 19.22	9.928	15 36 22.3	-45.85	16 19.00	0.072	14 56 38.23
Mon.	5	14 44 17.90	9.962	15 54 35.0	45.20	16 16.88	0.106	15 0 34.78
Tues.	6	14 48 17.41	9.997	16 12 31.8	44.53	16 13.93	0.141	15 4 31.34
Wed.	7	14 52 17.75	10.031	16 30 12.3	-43.83	16 10.14	0.175	15 8 27.89
Thur.	8	14 56 18.92	10.066	16 47 36.0	43.13	16 5.53	0.210	15 12 24.45
Frid.	9	15 0 20.92	10.100	17 4 42.6	42.41	16 0.09	0.244	15 16 21.00
Sat.	10	15 4 23.74	10.135	17 21 31.6	-41.67	15 53.82	0.279	15 20 17.56
SUN.	11	15 8 27.40	10.170	17 38 2.6	40.91	15 46.71	0.314	15 24 14.11
Mon.	12	15 12 31.89	10.205	17 54 15.1	40.13	15 38.77	0.349	15 28 10.67
Tues.	13	15 16 37.22	10.239	18 10 8.8	-39.34	15 30.00	0.383	15 32 7.22
Wed.	14	15 20 43.37	10.274	18 25 43.4	38.53	15 20.41	0.418	15 36 3.78
Thur.	15	15 24 50.35	10.308	18 40 58.4	37.71	15 9.99	0.452	15 40 0.33
Frid.	16	15 28 58.15	10.343	18 55 53.5	-36.87	14 58.74	0.487	15 43 56.89
Sat.	17	15 33 6.78	10.377	19 10 28.2	36.02	14 46.66	0.521	15 47 53.44
SUN.	18	15 37 16.24	10.412	19 24 42.2	35.15	14 33.76	0.556	15 51 50.00
Mon.	19	15 41 26.52	10.446	19 38 35.2	-34.27	14 20.03	0.590	15 55 46.55
Tues.	20	15 45 37.62	10.480	19 52 6.9	33.37	14 5.49	0.624	15 59 43.11
Wed.	21	15 49 49.53	10.514	20 5 16.8	32.45	13 50.14	0.658	16 3 39.66
Thur.	22	15 54 2.25	10.547	20 18 4.6	-31.52	13 33.98	0.691	16 7 36.22
Frid.	23	15 58 15.76	10.580	20 30 30.0	30.58	13 17.02	0.724	16 11 32.78
Sat.	24	16 2 30.06	10.613	20 42 32.7	29.63	12 59.27	0.757	16 15 29.34
SUN.	25	16 6 45.14	10.645	20 54 12.3	-28.66	12 40.75	0.789	16 19 25.89
Mon.	26	16 11 0.98	10.676	21 5 28.5	27.68	12 21.47	0.820	16 23 22.45
Tues.	27	16 15 17.57	10.706	21 16 20.9	26.69	12 1.44	0.850	16 27 19.01
Wed.	28	16 19 34.88	10.736	21 26 49.3	-25.68	11 40.69	0.880	16 31 15.57
Thur.	29	16 23 52.90	10.765	21 36 53.3	24.66	11 19.23	0.909	16 35 12.12
Frid.	30	16 28 11.60	10.793	21 46 32.6	23.62	10 57.08	0.937	16 39 8.68
Sat.	31	16 32 30.97	10.820	S. 21 55 47.0	-22.57	10 34.27	0.964	16 43 5.24

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
The sign — prefixed to the hourly change of declination indicates that south declinations are increasing.

Diff. for 1 hour,  
+9<sup>m</sup>.8565.  
(Table III.)

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	306	219° 31' 31.1"	31' 6.2"	150.34	+ 0.60	9.9964159	-45.7	9 13 40.48
2	307	220 31 40.3	31 15.3	150.42	0.62	9.9963065	45.5	9 9 44.57
3	308	221 31 51.4	31 26.3	150.49	0.60	9.9961975	45.3	9 5 48.66
4	309	222 32 4.4	31 39.2	150.56	+ 0.57	9.9960890	-45.1	9 1 52.75
5	310	223 32 19.2	31 53.9	150.63	0.50	9.9959810	44.9	8 57 56.84
6	311	224 32 35.7	32 10.2	150.71	0.40	9.9958736	44.6	8 54 0.93
7	312	225 32 53.8	32 28.2	150.78	+ 0.29	9.9957668	-44.3	8 50 5.03
8	313	226 33 13.4	32 47.7	150.85	0.17	9.9956608	44.0	8 46 9.12
9	314	227 33 34.6	33 8.8	150.91	+ 0.04	9.9955558	43.6	8 42 13.21
10	315	228 33 57.2	33 31.2	150.97	- 0.10	9.9954519	-43.1	8 38 17.30
11	316	229 34 21.1	33 54.9	151.03	0.22	9.9953491	42.5	8 34 21.39
12	317	230 34 46.3	34 20.0	151.08	0.32	9.9952477	41.9	8 30 25.48
13	318	231 35 12.9	34 46.5	151.14	- 0.41	9.9951479	-41.2	8 26 29.57
14	319	232 35 40.9	35 14.4	151.19	0.47	9.9950498	40.5	8 22 33.66
15	320	233 36 10.3	35 43.6	151.25	0.50	9.9949536	39.7	8 18 37.75
16	321	234 36 41.0	36 14.1	151.31	- 0.50	9.9948593	-38.8	8 14 41.84
17	322	235 37 13.1	36 46.1	151.37	0.47	9.9947672	37.9	8 10 45.93
18	323	236 37 46.7	37 19.5	151.42	0.41	9.9946772	37.0	8 6 50.02
19	324	237 38 21.7	37 54.4	151.46	- 0.33	9.9945893	-36.1	8 2 54.11
20	325	238 38 58.2	38 30.7	151.55	0.23	9.9945037	35.2	7 58 58.20
21	326	239 39 36.2	39 8.5	151.61	- 0.11	9.9944202	34.3	7 55 2.29
22	327	240 40 15.8	39 48.0	151.68	+ 0.02	9.9943390	-33.4	7 51 6.38
23	328	241 40 57.0	40 29.1	151.75	0.16	9.9942599	32.5	7 47 10.47
24	329	242 41 39.8	41 11.7	151.82	0.29	9.9941828	31.7	7 43 14.56
25	330	243 42 24.2	41 55.9	151.89	+ 0.41	9.9941077	-30.9	7 39 18.65
26	331	244 43 10.2	42 41.7	151.95	0.51	9.9940345	30.2	7 35 22.74
27	332	245 43 57.8	43 29.2	152.02	0.59	9.9939630	29.5	7 31 26.82
28	333	246 44 46.9	44 18.2	152.08	+ 0.64	9.9938932	-28.8	7 27 30.91
29	334	247 45 37.4	45 8.5	152.14	0.66	9.9938249	28.2	7 23 35.00
30	335	248 46 29.3	46 0.2	152.19	0.65	9.9937580	27.6	7 19 39.09
31	336	249 47 22.6	46 53.3	152.24	+ 0.61	9.9936925	-27.0	7 15 43.18
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>h</sup> .0.								
								Diff. for 1 Hour. — 9 <sup>s</sup> .8296. (Table II.)

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.	SEMI-DIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
							<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	16' 20.1	16' 26.8	59' 50.5	+2.12	60' 14.8	+1.90	22 26.8	2.22	26.9
2	16 32.6	16 37.4	60 36.1	1.63	60 53.8	1.30	23 21.1	2.31	27.9
3	16 41.0	16 43.4	61 7.2	0.92	61 15.9	+0.52	6		28.9
4	16 44.4	16 44.1	61 19.7	+0.10	61 18.4	-0.31	0 17.9	2.42	0.5
5	16 42.4	16 39.5	61 12.2	-0.71	61 1.4	1.08	1 17.2	2.52	1.5
6	16 35.4	16 30.3	60 46.4	1.40	60 27.8	1.68	2 18.3	2.57	2.5
7	16 24.4	16 17.9	60 6.2	-1.89	59 42.4	-2.05	3 19.9	2.55	3.5
8	16 11.0	16 3.8	59 17.0	2.16	58 50.6	2.22	4 20.0	2.45	4.5
9	15 56.5	15 49.3	58 23.8	2.23	57 57.2	2.19	5 17.1	2.30	5.5
10	15 42.2	15 35.4	57 31.3	-2.12	57 6.3	-2.03	6 10.5	2.14	6.5
11	15 29.0	15 22.9	56 42.6	1.91	56 20.4	1.79	7 0.1	2.00	7.5
12	15 17.3	15 12.1	55 59.7	1.65	55 40.7	1.51	7 46.7	1.88	8.5
13	15 7.5	15 3.2	55 23.5	-1.36	55 8.0	-1.22	8 30.8	1.80	9.5
14	14 59.5	14 56.2	54 54.2	1.08	54 42.0	0.95	9 13.6	1.76	10.5
15	14 53.3	14 50.8	54 31.4	0.82	54 22.3	0.70	9 55.7	1.75	11.5
16	14 48.7	14 47.0	54 14.7	-0.58	54 8.5	-0.46	10 38.0	1.78	12.5
17	14 45.7	14 44.7	54 3.6	0.35	54 0.0	0.25	11 21.1	1.82	13.5
18	14 44.1	14 43.8	53 57.7	-0.14	53 56.6	-0.04	12 5.5	1.88	14.5
19	14 43.8	14 44.2	53 56.8	+0.07	53 58.3	+0.18	12 51.5	1.95	15.5
20	14 45.0	14 46.2	54 1.2	0.30	54 5.5	0.42	13 39.1	2.01	16.5
21	14 47.8	14 49.8	54 11.3	0.55	54 18.7	0.69	14 27.9	2.05	17.5
22	14 52.3	14 55.2	54 27.8	+0.83	54 38.6	+0.98	15 17.4	2.07	18.5
23	14 58.7	15 2.6	54 51.2	1.13	55 5.7	1.29	16 7.0	2.07	19.5
24	15 7.1	15 12.1	55 22.2	1.45	55 40.6	1.61	16 56.5	2.05	20.5
25	15 17.6	15 23.7	56 0.9	+1.77	56 23.0	+1.92	17 45.4	2.03	21.5
26	15 30.2	15 37.1	56 46.9	2.06	57 12.4	2.18	18 34.0	2.03	22.5
27	15 44.4	15 51.9	57 39.1	2.28	58 6.7	2.32	19 22.9	2.05	23.5
28	15 59.5	16 7.2	58 34.8	+2.34	59 2.8	+2.31	20 12.6	2.10	24.5
29	16 14.6	16 21.7	59 30.2	2.23	59 56.2	2.09	21 4.1	2.20	25.5
30	16 28.3	16 34.1	60 20.3	1.89	60 41.6	1.63	21 58.4	2.33	26.5
31	16 38.9	16 42.6	60 59.3	+1.31	61 13.0	+0.95	22 55.9	2.47	27.5

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 1.					SATURDAY 3.				
0	12 <sup>h</sup> 24 <sup>m</sup> 16.17	2.9453	N. 2° 31' 28.3"	13.377	0	14 <sup>h</sup> 15 <sup>m</sup> 12.99	2.3986	S. 8° 19' 32.1"	13.190
1	12 26 30.95	2.9474	2 18 4.7	13.406	1	14 17 36.67	2.3967	8 32 37.9	13.078
2	12 28 45.86	2.9496	2 4 39.3	13.437	2	14 20 0.59	2.4007	8 45 40.8	13.093
3	12 31 0.90	2.9517	1 51 12.2	13.466	3	14 22 24.75	2.4047	8 58 40.7	12.979
4	12 33 16.07	2.9539	1 37 43.4	13.493	4	14 24 49.15	2.4087	9 11 37.5	12.919
5	12 35 31.37	2.9562	1 24 13.0	13.519	5	14 27 13.79	2.4126	9 24 31.0	12.864
6	12 37 46.81	2.9585	1 10 41.1	13.543	6	14 29 38.66	2.4166	9 37 21.2	12.807
7	12 40 2.39	2.9606	0 57 7.8	13.566	7	14 32 3.78	2.4207	9 50 7.9	12.749
8	12 42 18.11	2.9629	0 43 33.2	13.587	8	14 34 29.14	2.4247	10 2 51.1	12.690
9	12 44 33.97	2.9656	0 29 57.4	13.607	9	14 36 54.74	2.4287	10 15 30.7	12.628
10	12 46 49.98	2.9681	0 16 20.4	13.625	10	14 39 20.59	2.4326	10 28 6.5	12.564
11	12 49 6.14	2.9707	N. 0° 2' 42.4"	13.642	11	14 41 46.68	2.4366	10 40 38.4	12.496
12	12 51 22.46	2.9732	S. 0 10 56.6	13.657	12	14 44 13.01	2.4406	10 53 6.3	12.431
13	12 53 38.93	2.9758	0 24 36.5	13.671	13	14 46 39.59	2.4450	11 5 30.1	12.362
14	12 55 55.56	2.9785	0 38 17.1	13.682	14	14 49 6.41	2.4491	11 17 49.7	12.291
15	12 58 12.35	2.9812	0 51 58.4	13.693	15	14 51 33.48	2.4539	11 30 5.0	12.217
16	13 0 29.30	2.9839	1 5 40.3	13.703	16	14 54 0.79	2.4573	11 42 15.8	12.143
17	13 2 46.42	2.9867	1 19 22.8	13.719	17	14 56 28.35	2.4614	11 54 22.1	12.067
18	13 5 3.71	2.9896	1 33 5.7	13.718	18	14 58 56.16	2.4655	12 6 23.8	11.988
19	13 7 21.17	2.9924	1 46 48.9	13.729	19	15 1 24.21	2.4695	12 18 20.7	11.907
20	13 9 38.80	2.9953	2 0 32.3	13.734	20	15 3 52.50	2.4736	12 30 12.7	11.826
21	13 11 56.61	2.9983	2 14 15.8	13.736	21	15 6 21.04	2.4777	12 41 59.8	11.743
22	13 14 14.60	2.3013	2 27 59.4	13.736	22	15 8 49.82	2.4817	12 53 41.9	11.657
23	13 16 32.77	2.3044	S. 2° 41' 42.9"	13.733	23	15 11 18.84	2.4857	S. 13° 5' 18.7"	11.569
FRIDAY 2.					SUNDAY 4.				
0	13 16 51.13	2.3075	S. 2° 55' 26.2"	13.730	0	15 13 48.11	2.4898	S. 13° 16' 50.2"	11.480
1	13 21 9.67	2.3106	3 9 9.3	13.715	1	15 16 17.62	2.4938	13 28 16.3	11.390
2	13 23 28.40	2.3138	3 22 52.0	13.708	2	15 18 47.37	2.4977	13 39 37.0	11.298
3	13 25 47.33	2.3171	3 36 34.2	13.699	3	15 21 17.35	2.5017	13 50 52.1	11.204
4	13 28 6.45	2.3203	3 50 15.9	13.689	4	15 23 47.57	2.5057	14 2 1.5	11.108
5	13 30 25.77	2.3236	4 3 56.9	13.677	5	15 26 18.03	2.5096	14 13 5.1	11.010
6	13 32 45.28	2.3268	4 17 37.1	13.663	6	15 28 48.72	2.5134	14 24 2.7	10.910
7	13 35 4.99	2.3299	4 31 16.5	13.648	7	15 31 19.64	2.5173	14 34 54.3	10.810
8	13 37 24.91	2.3337	4 44 54.9	13.631	8	15 33 50.79	2.5212	14 45 39.9	10.707
9	13 39 45.04	2.3372	4 58 32.2	13.613	9	15 36 22.18	2.5250	14 56 19.2	10.602
10	13 42 5.37	2.3406	5 12 8.4	13.593	10	15 38 53.79	2.5287	15 6 52.2	10.497
11	13 44 25.91	2.3441	5 25 43.3	13.570	11	15 41 25.63	2.5325	15 17 18.9	10.391
12	13 46 46.67	2.3477	5 39 16.8	13.546	12	15 43 57.69	2.5362	15 27 39.1	10.282
13	13 49 7.64	2.3513	5 52 48.8	13.520	13	15 46 29.97	2.5398	15 37 52.7	10.171
14	13 51 28.83	2.3549	6 6 19.2	13.492	14	15 49 2.47	2.5434	15 47 59.6	10.058
15	13 53 50.23	2.3585	6 19 47.9	13.463	15	15 51 35.18	2.5470	15 57 59.7	9.944
16	13 56 11.85	2.3622	6 33 14.8	13.432	16	15 54 8.41	2.5506	16 7 52.9	9.829
17	13 58 33.70	2.3660	6 46 39.8	13.400	17	15 56 41.25	2.5540	16 17 39.2	9.712
18	14 0 55.77	2.3697	7 0 2.8	13.365	18	15 59 14.59	2.5573	16 27 18.4	9.593
19	14 3 18.07	2.3735	7 13 23.6	13.328	19	16 1 48.13	2.5607	16 36 50.4	9.474
20	14 5 40.59	2.3773	7 26 42.2	13.291	20	16 4 21.87	2.5640	16 46 15.3	9.354
21	14 8 3.34	2.3811	7 39 58.5	13.251	21	16 6 55.81	2.5672	16 55 32.9	9.232
22	14 10 26.32	2.3850	7 53 12.3	13.208	22	16 9 29.94	2.5704	17 4 43.1	9.106
23	14 12 49.54	2.3889	8 6 23.5	13.165	23	16 12 4.26	2.5736	17 13 45.8	8.982
24	14 15 12.99	2.3928	S. 8° 19' 32.1"	13.120	24	16 14 38.77	2.5767	S. 17° 22' 40.9"	8.855

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 5.					WEDNESDAY 7.				
0	16 14 38.77	2.5787	S. 17° 22' 40.9	8.855	0	18 20 10.81	2.6136	S. 21° 43' 6.0	1.768
1	16 17 13.46	2.5797	17 31 28.4	8.737	1	18 22 47.58	2.6119	21 44 47.4	1.613
2	16 19 48.33	2.5806	17 40 8.2	8.598	2	18 25 24.24	2.6099	21 46 19.5	1.468
3	16 22 23.37	2.5854	17 48 40.2	8.467	3	18 28 0.77	2.6077	21 47 42.4	1.304
4	16 24 58.58	2.5893	17 57 4.3	8.335	4	18 30 37.16	2.6064	21 48 56.0	1.149
5	16 27 33.95	2.5909	18 5 20.4	8.202	5	18 33 13.41	2.6030	21 50 0.3	0.994
6	16 30 9.48	2.5935	18 13 28.5	8.068	6	18 35 49.52	2.6006	21 50 55.3	0.840
7	16 32 45.17	2.5980	18 21 28.6	7.933	7	18 38 25.48	2.5979	21 51 41.1	0.687
8	16 35 21.00	2.5994	18 29 20.5	7.797	8	18 41 1.27	2.5961	21 52 17.8	0.535
9	16 37 56.98	2.6006	18 37 4.2	7.659	9	18 43 36.89	2.5993	21 52 45.3	0.383
10	16 40 33.10	2.6029	18 44 39.6	7.520	10	18 46 12.34	2.5994	21 53 3.6	0.230
11	16 43 9.36	2.6054	18 52 6.6	7.380	11	18 48 47.62	2.5984	21 53 12.8	- 0.078
12	16 45 45.75	2.6076	18 59 25.2	7.239	12	18 51 22.71	2.5969	21 53 13.0	+ 0.073
13	16 48 22.27	2.6096	19 6 35.3	7.097	13	18 53 57.61	2.5960	21 53 4.1	0.923
14	16 50 58.90	2.6114	19 13 36.9	6.955	14	18 56 32.31	2.5766	21 52 46.2	0.379
15	16 53 35.64	2.6139	19 20 29.9	6.812	15	18 59 6.80	2.5731	21 52 19.4	0.599
16	16 56 12.49	2.6151	19 27 14.3	6.667	16	19 1 41.06	2.5696	21 51 43.6	0.671
17	16 58 49.45	2.6167	19 33 50.0	6.522	17	19 4 15.15	2.5680	21 50 58.9	0.819
18	17 1 26.50	2.6198	19 40 16.9	6.375	18	19 6 49.00	2.5693	21 50 5.3	0.966
19	17 4 3.64	2.6197	19 46 35.0	6.228	19	19 9 22.62	2.5594	21 49 2.9	1.112
20	17 6 40.87	2.6211	19 52 44.3	6.081	20	19 11 56.01	2.5544	21 47 51.8	1.258
21	17 9 18.17	2.6232	19 58 44.8	5.933	21	19 14 29.15	2.5503	21 46 31.9	1.404
22	17 11 55.54	2.6234	20 4 30.3	5.785	22	19 17 2.05	2.5499	21 45 3.3	1.548
23	17 14 32.96	2.6246	S. 20° 10' 18.8	5.632	23	19 19 34.70	2.5491	S. 21° 43' 26.1	1.691
TUESDAY 6.					THURSDAY 8.				
0	17 17 10.49	2.6256	S. 20° 15' 52.2	5.489	0	19 22 7.10	2.5376	S. 21° 41' 40.4	1.834
1	17 19 48.05	2.6264	20 21 16.6	5.331	1	19 24 39.24	2.5334	21 39 46.1	1.976
2	17 22 25.65	2.6270	20 26 31.9	5.180	2	19 27 11.11	2.5299	21 37 43.3	2.117
3	17 25 3.29	2.6276	20 31 38.2	5.028	3	19 29 42.71	2.5244	21 35 32.1	2.257
4	17 27 40.96	2.6281	20 36 35.3	4.875	4	19 32 14.04	2.5198	21 33 12.5	2.396
5	17 30 18.66	2.6285	20 41 23.2	4.722	5	19 34 45.09	2.5159	21 30 44.6	2.534
6	17 32 56.38	2.6287	20 46 1.9	4.568	6	19 37 15.86	2.5104	21 28 8.4	2.679
7	17 35 34.11	2.6290	20 50 31.3	4.414	7	19 39 46.34	2.5056	21 25 24.0	2.806
8	17 38 11.85	2.6290	20 54 51.5	4.260	8	19 42 16.53	2.5007	21 22 31.4	2.944
9	17 40 49.59	2.6290	20 59 2.5	4.106	9	19 44 46.42	2.4957	21 19 30.7	3.078
10	17 43 27.32	2.6287	21 3 4.2	3.950	10	19 47 16.01	2.4907	21 16 22.0	3.211
11	17 46 5.04	2.6284	21 6 56.5	3.794	11	19 49 45.30	2.4856	21 13 5.4	3.343
12	17 48 42.73	2.6279	21 10 39.5	3.639	12	19 52 14.28	2.4804	21 9 40.9	3.474
13	17 51 20.39	2.6274	21 14 13.2	3.483	13	19 54 42.95	2.4752	21 6 8.5	3.605
14	17 53 58.02	2.6268	21 17 37.5	3.328	14	19 57 11.30	2.4699	21 2 28.3	3.734
15	17 56 35.61	2.6261	21 20 52.5	3.172	15	19 59 39.33	2.4645	20 58 40.4	3.869
16	17 59 13.15	2.6252	21 23 58.1	3.015	16	20 2 7.04	2.4592	20 54 44.8	3.990
17	18 1 50.63	2.6241	21 26 54.3	2.859	17	20 4 34.43	2.4538	20 50 41.6	4.116
18	18 4 28.04	2.6229	21 29 41.2	2.703	18	20 7 1.49	2.4483	20 46 30.9	4.241
19	18 7 5.38	2.6217	21 32 18.7	2.547	19	20 9 28.22	2.4428	20 42 12.7	4.365
20	18 9 42.65	2.6205	21 34 46.9	2.391	20	20 11 54.62	2.4372	20 37 47.1	4.487
21	18 12 19.84	2.6191	21 37 5.7	2.235	21	20 14 20.68	2.4316	20 33 14.2	4.608
22	18 14 56.94	2.6174	21 39 15.1	2.079	22	20 16 46.41	2.4259	20 28 34.1	4.729
23	18 17 33.93	2.6156	21 41 15.2	1.924	23	20 19 11.79	2.4202	20 23 46.7	4.849
24	18 20 10.81	2.6136	S. 21° 43' 6.0	1.768	24	20 21 36.83	2.4145	S. 20° 18' 52.2	4.967



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 9.					SUNDAY 11.				
0	<sup>h</sup> 20 <sup>m</sup> 21 <sup>s</sup> 36.83	2.4145	S. 20° 18' 52.2"	4.967	0	<sup>h</sup> 22 <sup>m</sup> 10 <sup>s</sup> 42.30	2.1340	S. 14° 26' 45.3"	9.256
1	20 24 1.53	2.4087	20 13 50.7	5.083	1	22 12 50.24	2.1396	14 17 28.1	9.317
2	20 26 25.88	2.4089	20 8 42.2	5.199	2	22 14 57.86	2.1943	14 8 7.2	9.377
3	20 28 49.88	2.3971	20 3 26.8	5.314	3	22 17 5.16	2.1191	13 58 42.8	9.437
4	20 31 13.53	2.3919	19 58 4.5	5.498	4	22 19 12.15	2.1140	13 49 14.8	9.495
5	20 33 36.83	2.3853	19 52 35.4	5.541	5	22 21 18.84	2.1069	13 39 43.4	9.559
6	20 35 59.77	2.3794	19 46 59.6	5.652	6	22 23 25.22	2.1038	13 30 8.6	9.608
7	20 38 22.36	2.3735	19 41 17.2	5.762	7	22 25 31.30	2.0968	13 20 30.5	9.663
8	20 40 44.59	2.3676	19 35 28.2	5.870	8	22 27 37.08	2.0938	13 10 49.1	9.718
9	20 43 6.47	2.3617	19 29 32.8	5.977	9	22 29 42.56	2.0868	13 1 4.4	9.778
10	20 45 27.99	2.3557	19 23 31.0	6.083	10	22 31 47.74	2.0839	12 51 16.5	9.834
11	20 47 49.15	2.3497	19 17 22.8	6.189	11	22 33 52.63	2.0791	12 41 25.5	9.875
12	20 50 9.96	2.3438	19 11 8.3	6.293	12	22 35 57.23	2.0743	12 31 31.5	9.924
13	20 52 30.41	2.3378	19 4 47.6	6.396	13	22 38 1.55	2.0696	12 21 34.6	9.973
14	20 54 50.49	2.3317	18 58 20.8	6.497	14	22 40 5.58	2.0648	12 11 34.7	10.022
15	20 57 10.21	2.3257	18 51 47.9	6.598	15	22 42 9.33	2.0602	12 1 31.9	10.070
16	20 59 29.57	2.3197	18 45 9.0	6.697	16	22 44 12.81	2.0557	11 51 26.3	10.116
17	21 1 48.57	2.3137	18 38 24.2	6.796	17	22 46 16.02	2.0512	11 41 18.0	10.160
18	21 4 7.22	2.3077	18 31 33.5	6.893	18	22 48 18.95	2.0466	11 31 7.1	10.204
19	21 6 25.50	2.3017	18 24 37.1	6.988	19	22 50 21.61	2.0422	11 20 53.5	10.248
20	21 8 43.42	2.2957	18 17 35.0	7.083	20	22 52 24.01	2.0378	11 10 37.3	10.291
21	21 11 0.98	2.2896	18 10 27.2	7.176	21	22 54 26.15	2.0335	11 0 18.6	10.333
22	21 13 18.17	2.2836	18 3 13.9	7.268	22	22 56 28.03	2.0292	10 49 57.5	10.372
23	21 15 35.01	2.2777	S. 17° 55' 55.1"	7.359	23	22 58 29.66	2.0250	S. 10° 39' 33.9"	10.419
SATURDAY 10.					MONDAY 12.				
0	21 17 51.49	2.2717	S. 17° 48' 30.8"	7.449	0	23 0 31.03	2.0206	S. 10° 29' 8.0"	10.451
1	21 20 7.61	2.2657	17 41 1.2	7.537	1	23 2 32.15	2.0167	10 18 39.8	10.499
2	21 22 23.38	2.2598	17 33 26.3	7.625	2	23 4 33.03	2.0127	10 8 9.3	10.546
3	21 24 38.79	2.2538	17 25 46.2	7.711	3	23 6 33.67	2.0087	9 57 36.7	10.592
4	21 26 53.84	2.2479	17 18 1.0	7.795	4	23 8 34.07	2.0047	9 47 1.9	10.597
5	21 29 8.54	2.2420	17 10 10.8	7.879	5	23 10 34.23	2.0006	9 36 25.0	10.639
6	21 31 22.88	2.2361	17 2 15.6	7.962	6	23 12 34.16	1.9969	9 25 46.1	10.685
7	21 33 36.87	2.2302	16 54 15.4	8.044	7	23 14 33.86	1.9931	9 15 5.2	10.727
8	21 35 50.51	2.2244	16 46 10.3	8.124	8	23 16 33.33	1.9893	9 4 22.4	10.769
9	21 38 3.80	2.2186	16 38 0.5	8.203	9	23 18 32.58	1.9857	8 53 37.7	10.780
10	21 40 16.74	2.2128	16 29 46.0	8.281	10	23 20 31.61	1.9821	8 42 51.2	10.790
11	21 42 29.33	2.2070	16 21 26.8	8.358	11	23 22 30.43	1.9786	8 32 2.9	10.819
12	21 44 41.58	2.2013	16 13 3.0	8.434	12	23 24 29.04	1.9751	8 21 12.9	10.847
13	21 46 53.49	2.1956	16 4 34.7	8.508	13	23 26 27.44	1.9716	8 10 21.3	10.874
14	21 49 5.05	2.1899	15 56 2.0	8.582	14	23 28 25.63	1.9682	7 59 28.0	10.901
15	21 51 16.27	2.1842	15 47 24.9	8.654	15	23 30 23.62	1.9649	7 48 33.1	10.927
16	21 53 27.15	2.1786	15 38 43.5	8.725	16	23 32 21.41	1.9616	7 37 36.7	10.953
17	21 55 37.70	2.1731	15 29 57.9	8.795	17	23 34 19.01	1.9583	7 26 38.8	10.977
18	21 57 47.92	2.1676	15 21 8.1	8.864	18	23 36 16.41	1.9551	7 15 39.5	11.000
19	21 59 57.81	2.1620	15 12 14.2	8.932	19	23 38 13.62	1.9520	7 4 38.8	11.023
20	22 2 7.36	2.1564	15 3 16.2	9.000	20	23 40 10.65	1.9490	6 53 36.8	11.044
21	22 4 16.58	2.1510	14 54 14.3	9.064	21	23 42 7.50	1.9460	6 42 33.5	11.065
22	22 6 25.48	2.1456	14 45 8.5	9.129	22	23 44 4.17	1.9431	6 31 29.0	11.085
23	22 8 34.05	2.1402	14 35 58.8	9.193	23	23 46 0.67	1.9402	6 20 23.3	11.104
24	22 10 42.30	2.1349	S. 14° 26' 45.3"	9.256	24	23 47 57.00	1.9374	S. 6° 9' 16.5"	11.122

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 13.					THURSDAY 15.				
0	<sup>h</sup> 23 <sup>m</sup> 47 <sup>s</sup> 57.00	1.9374	S. 6° 9' 16.5	11.122	0	<sup>h</sup> 1 <sup>m</sup> 18 <sup>s</sup> 45.92	1.8676	N. 2° 51' 58.7	11.150
1	23 49 53.16	1.9347	5 58 8.6	11.140	1	1 20 37.97	1.8674	3 3 7.8	11.143
2	23 51 49.16	1.9319	5 46 59.7	11.157	2	1 22 30.01	1.8673	3 14 15.9	11.196
3	23 53 44.99	1.9299	5 35 49.7	11.174	3	1 24 22.05	1.8673	3 25 22.9	11.106
4	23 55 40.66	1.9266	5 24 38.8	11.189	4	1 26 14.09	1.8673	3 36 28.9	11.091
5	23 57 36.18	1.9241	5 13 27.0	11.204	5	1 28 6.13	1.8673	3 47 33.8	11.073
6	23 59 31.56	1.9217	5 2 14.3	11.218	6	1 29 58.17	1.8674	3 58 37.6	11.053
7	0 1 26.79	1.9192	4 51 0.8	11.231	7	1 31 50.22	1.8676	4 9 40.2	11.033
8	0 3 21.87	1.9168	4 39 46.6	11.244	8	1 33 42.28	1.8676	4 20 41.5	11.019
9	0 5 16.81	1.9146	4 28 31.6	11.256	9	1 35 34.35	1.8680	4 31 41.6	10.991
10	0 7 11.62	1.9123	4 17 15.9	11.267	10	1 37 26.44	1.8683	4 42 40.4	10.960
11	0 9 6.29	1.9101	4 5 59.6	11.277	11	1 39 18.55	1.8686	4 53 37.8	10.946
12	0 11 0.83	1.9079	3 54 42.7	11.287	12	1 41 10.67	1.8689	5 4 39.9	10.923
13	0 12 55.24	1.9056	3 43 25.2	11.296	13	1 43 2.82	1.8694	5 15 28.6	10.890
14	0 14 49.53	1.9038	3 32 7.3	11.309	14	1 44 55.00	1.8698	5 26 21.8	10.874
15	0 16 43.70	1.9019	3 20 48.9	11.310	15	1 46 47.20	1.8703	5 37 13.5	10.849
16	0 18 37.76	1.9001	3 9 30.1	11.317	16	1 48 39.43	1.8708	5 48 3.7	10.823
17	0 20 31.71	1.8982	2 58 10.9	11.322	17	1 50 31.70	1.8715	5 58 52.3	10.797
18	0 22 25.55	1.8964	2 46 51.4	11.327	18	1 52 24.01	1.8722	6 9 39.3	10.770
19	0 24 19.28	1.8947	2 35 31.6	11.339	19	1 54 16.36	1.8729	6 20 24.7	10.749
20	0 26 12.91	1.8930	2 24 11.6	11.335	20	1 56 8.75	1.8736	6 31 8.3	10.713
21	0 28 6.44	1.8913	2 12 51.4	11.338	21	1 58 1.19	1.8743	6 41 50.2	10.683
22	0 29 59.87	1.8897	2 1 31.0	11.341	22	1 59 53.67	1.8751	6 52 30.3	10.653
23	0 31 53.20	1.8881	S. 1 50 10.5	11.349	23	2 1 46.20	1.8760	N. 7 3 8.6	10.623
WEDNESDAY 14.					FRIDAY 16.				
0	0 33 46.44	1.8867	S. 1 38 49.9	11.343	0	2 3 38.79	1.8769	N. 7 13 45.1	10.592
1	0 35 39.60	1.8853	1 27 29.3	11.343	1	2 5 31.43	1.8778	7 24 19.7	10.580
2	0 37 32.68	1.8840	1 16 8.7	11.342	2	2 7 24.13	1.8788	7 34 52.3	10.568
3	0 39 25.68	1.8827	1 4 48.2	11.341	3	2 9 16.89	1.8798	7 45 23.0	10.496
4	0 41 18.60	1.8814	0 53 27.8	11.339	4	2 11 9.71	1.8809	7 55 51.7	10.461
5	0 43 11.45	1.8806	0 42 7.5	11.337	5	2 13 2.60	1.8820	8 6 18.3	10.427
6	0 45 4.23	1.8791	0 30 47.3	11.335	6	2 14 55.55	1.8831	8 16 42.9	10.392
7	0 46 56.94	1.8780	0 19 27.3	11.331	7	2 16 48.57	1.8843	8 27 5.4	10.356
8	0 48 49.59	1.8770	S. 0 8 7.6	11.325	8	2 18 41.66	1.8855	8 37 25.7	10.319
9	0 50 42.18	1.8760	N. 0 3 11.7	11.319	9	2 20 34.83	1.8867	8 47 43.7	10.289
10	0 52 34.71	1.8751	0 14 30.7	11.313	10	2 22 28.07	1.8880	8 57 59.5	10.244
11	0 54 27.19	1.8742	0 25 49.3	11.307	11	2 24 21.39	1.8894	9 8 13.0	10.207
12	0 56 19.61	1.8733	0 37 7.6	11.301	12	2 26 14.80	1.8908	9 18 24.3	10.168
13	0 58 11.99	1.8726	0 48 25.4	11.299	13	2 28 8.29	1.8922	9 28 33.2	10.128
14	1 0 4.33	1.8719	0 59 42.6	11.293	14	2 30 1.86	1.8936	9 38 39.6	10.087
15	1 1 56.62	1.8712	1 10 59.3	11.293	15	2 31 55.52	1.8951	9 48 43.6	10.046
16	1 3 48.87	1.8706	1 22 15.4	11.293	16	2 33 49.27	1.8966	9 58 45.1	10.005
17	1 5 41.09	1.8701	1 33 30.9	11.293	17	2 35 43.11	1.8981	10 8 44.2	9.963
18	1 7 33.28	1.8696	1 44 45.8	11.292	18	2 37 37.04	1.8997	10 18 40.7	9.920
19	1 9 25.44	1.8692	1 56 0.0	11.290	19	2 39 31.07	1.9013	10 28 34.6	9.876
20	1 11 17.58	1.8688	2 7 13.4	11.217	20	2 41 25.20	1.9030	10 38 25.8	9.833
21	1 13 9.69	1.8684	2 18 26.0	11.203	21	2 43 19.43	1.9047	10 48 14.4	9.787
22	1 15 1.78	1.8681	2 29 37.8	11.189	22	2 45 13.76	1.9064	10 58 0.3	9.749
23	1 16 53.86	1.8678	2 40 48.7	11.174	23	2 47 8.19	1.9081	11 7 43.4	9.698
24	1 18 45.92	1.8676	N. 2 51 58.7	11.159	24	2 49 2.73	1.9099	N. 11 17 23.7	9.648

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 17.					MONDAY 19.				
0	2 49 2.73	1.9099	N.11° 17' 23.7	9.648	0	4 23 12.94	2.0901	N.17° 54' 11.4	6.640
1	2 50 57.38	1.9117	11 27 1.2	9.691	1	4 25 14.22	2.0926	18 0 47.5	6.592
2	2 52 52.14	1.9135	11 36 35.8	9.559	2	4 27 15.65	2.0951	18 7 18.9	6.483
3	2 54 47.00	1.9153	11 46 7.5	9.503	3	4 29 17.23	2.0977	18 13 45.5	6.404
4	2 56 41.98	1.9179	11 55 36.2	9.453	4	4 31 18.97	2.0309	18 20 7.4	6.325
5	2 58 37.07	1.9199	12 5 1.9	9.404	5	4 33 20.86	2.0337	18 26 24.5	6.245
6	3 0 32.28	1.9219	12 14 24.7	9.354	6	4 35 22.90	2.0359	18 32 36.8	6.164
7	3 2 27.61	1.9239	12 23 44.4	9.303	7	4 37 25.09	2.0377	18 38 44.2	6.083
8	3 4 23.06	1.9251	12 33 0.9	9.249	8	4 39 27.43	2.0403	18 44 46.7	6.001
9	3 6 18.62	1.9271	12 42 14.3	9.197	9	4 41 29.93	2.0426	18 50 44.3	5.918
10	3 8 14.31	1.9292	12 51 24.6	9.144	10	4 43 32.57	2.0453	18 56 36.9	5.835
11	3 10 10.12	1.9313	13 0 31.6	9.089	11	4 45 35.36	2.0478	19 2 24.5	5.752
12	3 12 6.06	1.9334	13 9 35.3	9.034	12	4 47 38.31	2.0504	19 8 7.1	5.667
13	3 14 2.13	1.9356	13 18 35.7	8.979	13	4 49 41.41	2.0529	19 13 44.6	5.582
14	3 15 58.32	1.9377	13 27 32.8	8.923	14	4 51 44.65	2.0553	19 19 17.0	5.497
15	3 17 54.65	1.9399	13 36 26.5	8.866	15	4 53 48.04	2.0577	19 24 44.3	5.412
16	3 19 51.10	1.9420	13 45 16.8	8.809	16	4 55 51.57	2.0601	19 30 6.4	5.325
17	3 21 47.69	1.9442	13 54 3.6	8.754	17	4 57 55.25	2.0626	19 35 23.3	5.238
18	3 23 44.41	1.9465	14 2 47.0	8.693	18	4 59 59.08	2.0650	19 40 35.0	5.151
19	3 25 41.27	1.9487	14 11 26.8	8.633	19	5 2 3.05	2.0673	19 45 41.4	5.063
20	3 27 38.26	1.9510	14 20 3.0	8.573	20	5 4 7.16	2.0697	19 50 42.5	4.975
21	3 29 35.39	1.9533	14 28 35.6	8.513	21	5 6 11.42	2.0721	19 55 38.4	4.887
22	3 31 32.66	1.9557	14 37 4.6	8.452	22	5 8 15.82	2.0745	20 0 28.9	4.797
23	3 33 30.07	1.9580	N.14 45 29.9	8.390	23	5 10 20.36	2.0768	N.20 5 14.0	4.707
SUNDAY 18.					TUESDAY 20.				
0	3 35 27.62	1.9603	N.14 53 51.4	8.327	0	5 12 25.04	2.0792	N.20 9 53.7	4.617
1	3 37 25.31	1.9627	15 2 9.1	8.264	1	5 14 29.86	2.0815	20 14 28.0	4.528
2	3 39 23.14	1.9651	15 10 23.1	8.201	2	5 16 34.82	2.0837	20 18 56.8	4.434
3	3 41 21.12	1.9675	15 18 33.3	8.137	3	5 18 39.91	2.0860	20 23 20.1	4.342
4	3 43 19.24	1.9699	15 26 39.6	8.073	4	5 20 45.14	2.0882	20 27 37.9	4.250
5	3 45 17.51	1.9723	15 34 41.9	8.006	5	5 22 50.50	2.0904	20 31 50.1	4.157
6	3 47 15.92	1.9747	15 42 40.3	7.940	6	5 24 55.99	2.0927	20 35 56.7	4.063
7	3 49 14.48	1.9770	15 50 34.7	7.873	7	5 27 1.62	2.0949	20 39 57.7	3.970
8	3 51 13.19	1.9797	15 58 25.0	7.806	8	5 29 7.37	2.0969	20 43 53.1	3.877
9	3 53 12.05	1.9822	16 6 11.3	7.737	9	5 31 13.25	2.0991	20 47 42.9	3.783
10	3 55 11.05	1.9846	16 13 53.5	7.668	10	5 33 19.26	2.1012	20 51 27.0	3.687
11	3 57 10.20	1.9871	16 21 31.5	7.598	11	5 35 25.39	2.1032	20 55 5.3	3.591
12	3 59 9.50	1.9897	16 29 5.3	7.528	12	5 37 31.64	2.1052	20 58 37.9	3.495
13	4 1 8.96	1.9922	16 36 34.9	7.457	13	5 39 38.02	2.1073	21 2 4.7	3.399
14	4 3 8.56	1.9946	16 44 0.2	7.386	14	5 41 44.52	2.1093	21 5 25.8	3.303
15	4 5 8.31	1.9971	16 51 21.2	7.314	15	5 43 51.14	2.1113	21 8 41.1	3.207
16	4 7 8.21	1.9997	16 58 37.9	7.242	16	5 45 57.88	2.1132	21 11 50.6	3.109
17	4 9 8.27	2.0022	17 5 50.3	7.170	17	5 48 4.73	2.1151	21 14 54.2	3.011
18	4 11 8.48	2.0047	17 12 58.3	7.098	18	5 50 11.69	2.1170	21 17 51.9	2.912
19	4 13 8.84	2.0073	17 20 1.8	7.021	19	5 52 18.77	2.1189	21 20 43.7	2.814
20	4 15 9.35	2.0098	17 27 0.8	6.946	20	5 54 25.96	2.1207	21 23 29.6	2.716
21	4 17 10.02	2.0124	17 33 55.3	6.871	21	5 56 33.25	2.1224	21 26 9.6	2.617
22	4 19 10.84	2.0149	17 40 45.3	6.795	22	5 58 40.65	2.1242	21 28 43.6	2.517
23	4 21 11.81	2.0175	17 47 30.7	6.718	23	6 0 48.15	2.1259	21 31 11.6	2.417
24	4 23 12.94	2.0201	N.17 54 11.4	6.640	24	6 2 55.76	2.1277	N.21 33 33.7	2.317

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 21.					FRIDAY 23.				
0	6 2 55.76	2.1977	N.21° 33' 33.7"	2.317	0	7 46 19.85	2.1668	N.21° 25' 9.7"	2.711
1	6 5 3.47	2.1983	21 35 49.7	2.917	1	7 48 29.85	2.1667	21 22 23.8	2.817
2	6 7 11.28	2.1300	21 37 59.7	2.116	2	7 50 39.85	2.1666	21 19 31.6	2.922
3	6 9 19.18	2.1325	21 40 3.6	2.014	3	7 52 49.84	2.1664	21 16 33.1	3.028
4	6 11 27.18	2.1341	21 42 1.4	1.913	4	7 54 59.82	2.1663	21 13 28.2	3.134
5	6 13 35.27	2.1356	21 43 53.1	1.812	5	7 57 9.79	2.1662	21 10 17.0	3.239
6	6 15 43.45	2.1371	21 45 38.8	1.710	6	7 59 19.76	2.1660	21 6 59.5	3.344
7	6 17 51.72	2.1386	21 47 18.3	1.607	7	8 1 29.71	2.1657	21 3 35.7	3.449
8	6 20 0.08	2.1400	21 48 51.7	1.505	8	8 3 39.64	2.1654	21 0 5.6	3.554
9	6 22 8.52	2.1414	21 50 18.9	1.402	9	8 5 49.56	2.1651	20 56 29.2	3.659
10	6 24 17.05	2.1427	21 51 39.9	1.299	10	8 7 59.46	2.1648	20 52 46.5	3.764
11	6 26 25.65	2.1440	21 52 54.8	1.196	11	8 10 9.34	2.1645	20 48 57.5	3.868
12	6 28 34.33	2.1453	21 54 3.5	1.092	12	8 12 19.20	2.1642	20 45 2.3	3.972
13	6 30 43.09	2.1466	21 55 5.9	0.988	13	8 14 29.04	2.1638	20 41 0.8	4.077
14	6 32 51.92	2.1478	21 56 2.1	0.885	14	8 16 38.85	2.1633	20 36 53.1	4.181
15	6 35 0.82	2.1490	21 56 52.1	0.781	15	8 18 48.64	2.1629	20 32 39.1	4.285
16	6 37 9.79	2.1501	21 57 35.8	0.677	16	8 20 58.40	2.1624	20 28 18.9	4.388
17	6 39 18.83	2.1512	21 58 13.3	0.572	17	8 23 8.13	2.1619	20 23 52.6	4.490
18	6 41 27.93	2.1522	21 58 44.5	0.467	18	8 25 17.83	2.1614	20 19 20.1	4.593
19	6 43 37.10	2.1532	21 59 9.4	0.362	19	8 27 27.50	2.1609	20 14 41.4	4.696
20	6 45 46.32	2.1542	21 59 28.0	0.257	20	8 29 37.14	2.1603	20 9 56.5	4.799
21	6 47 55.60	2.1551	21 59 40.3	0.152	21	8 31 46.74	2.1598	20 5 5.5	4.901
22	6 50 4.93	2.1560	21 59 46.3	+ 0.047	22	8 33 56.31	2.1593	20 0 8.4	5.003
23	6 52 14.32	2.1569	N.21 59 46.0	- 0.066	23	8 36 5.85	2.1587	N.19 55 5.2	5.106
THURSDAY 22.					SATURDAY 24.				
0	6 54 23.76	2.1577	N.21 59 39.3	0.164	0	8 38 15.35	2.1580	N.19 49 55.8	5.207
1	6 56 33.25	2.1585	21 59 26.3	0.270	1	8 40 24.81	2.1573	19 44 40.4	5.308
2	6 58 42.78	2.1592	21 59 6.9	0.376	2	8 42 34.23	2.1567	19 39 18.9	5.408
3	7 0 52.36	2.1600	21 58 41.2	0.481	3	8 44 43.62	2.1561	19 33 51.4	5.508
4	7 3 1.98	2.1607	21 58 9.2	0.587	4	8 46 52.97	2.1555	19 28 17.9	5.609
5	7 5 11.64	2.1613	21 57 30.8	0.693	5	8 49 2.28	2.1548	19 22 38.3	5.710
6	7 7 21.34	2.1619	21 56 46.0	0.799	6	8 51 11.54	2.1540	19 16 52.7	5.809
7	7 9 31.07	2.1625	21 55 54.9	0.905	7	8 53 20.76	2.1533	19 11 1.2	5.908
8	7 11 40.84	2.1631	21 54 57.4	1.012	8	8 55 29.94	2.1526	19 5 3.7	6.007
9	7 13 50.64	2.1636	21 53 53.5	1.118	9	8 57 39.08	2.1519	18 59 0.3	6.106
10	7 16 0.47	2.1640	21 52 43.2	1.225	10	8 59 48.17	2.1512	18 52 51.0	6.204
11	7 18 10.32	2.1644	21 51 26.5	1.331	11	9 1 57.22	2.1505	18 46 35.8	6.302
12	7 20 20.20	2.1648	21 50 3.5	1.437	12	9 4 6.23	2.1497	18 40 14.7	6.400
13	7 22 30.10	2.1652	21 48 34.1	1.543	13	9 6 15.19	2.1489	18 33 47.8	6.497
14	7 24 40.02	2.1655	21 46 58.3	1.650	14	9 8 24.10	2.1482	18 27 15.1	6.594
15	7 26 49.96	2.1657	21 45 16.1	1.756	15	9 10 32.97	2.1475	18 20 36.5	6.691
16	7 28 59.91	2.1660	21 43 27.5	1.862	16	9 12 41.80	2.1467	18 13 52.2	6.787
17	7 31 9.88	2.1662	21 41 32.6	1.968	17	9 14 50.58	2.1459	18 7 2.1	6.882
18	7 33 19.86	2.1664	21 39 31.3	2.075	18	9 16 59.31	2.1452	18 0 6.3	6.977
19	7 35 29.85	2.1665	21 37 23.6	2.181	19	9 19 8.00	2.1444	17 53 4.8	7.072
20	7 37 39.84	2.1666	21 35 9.5	2.287	20	9 21 16.64	2.1436	17 45 57.6	7.167
21	7 39 49.84	2.1667	21 32 49.1	2.393	21	9 23 25.23	2.1428	17 38 44.7	7.262
22	7 41 59.84	2.1667	21 30 22.3	2.499	22	9 25 33.78	2.1421	17 31 26.2	7.356
23	7 44 9.84	2.1668	21 27 49.2	2.605	23	9 27 42.28	2.1413	17 24 2.1	7.448
24	7 46 19.85	2.1668	N.21 25 9.7	2.711	24	9 29 50.74	2.1406	N.17 16 32.5	7.540

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 25.					TUESDAY 27.				
0	9 29 50.74	2.1406	N. 17 16 32.5	7.540	0	11 12 0.77	2.1982	N. 9 37 25.9	11.300
1	9 31 59.15	2.1398	17 8 57.3	7.632	1	11 14 8.36	2.1967	9 26 2.3	11.425
2	9 34 7.52	2.1391	17 1 16.6	7.725	2	11 16 15.98	2.1972	9 14 34.9	11.487
3	9 36 15.84	2.1383	16 53 30.3	7.817	3	11 18 23.62	2.1977	9 3 3.8	11.549
4	9 38 24.12	2.1376	16 45 38.6	7.908	4	11 20 31.30	2.1983	8 51 29.0	11.611
5	9 40 32.36	2.1369	16 37 41.4	7.998	5	11 22 39.02	2.1990	8 39 50.5	11.671
6	9 42 40.55	2.1362	16 29 38.8	8.088	6	11 24 46.78	2.1997	8 28 8.5	11.730
7	9 44 48.70	2.1355	16 21 30.8	8.177	7	11 26 54.58	2.1304	8 16 22.9	11.789
8	9 46 56.81	2.1348	16 13 17.5	8.267	8	11 29 2.43	2.1318	8 4 33.8	11.847
9	9 49 4.88	2.1342	16 4 58.8	8.356	9	11 31 10.33	2.1321	7 52 41.3	11.904
10	9 51 12.91	2.1335	15 56 34.8	8.444	10	11 33 18.28	2.1330	7 40 45.3	11.961
11	9 53 20.90	2.1328	15 48 5.6	8.531	11	11 35 26.29	2.1340	7 28 45.9	12.017
12	9 55 28.85	2.1322	15 39 31.1	8.618	12	11 37 34.36	2.1350	7 16 43.2	12.072
13	9 57 36.76	2.1315	15 30 51.4	8.705	13	11 39 42.49	2.1360	7 4 37.3	12.125
14	9 59 44.63	2.1307	15 22 6.5	8.791	14	11 41 50.68	2.1371	6 52 28.2	12.178
15	10 1 52.47	2.1304	15 13 16.5	8.876	15	11 43 58.94	2.1382	6 40 15.9	12.230
16	10 4 0.28	2.1296	15 4 21.4	8.961	16	11 46 7.27	2.1394	6 28 0.6	12.281
17	10 6 8.05	2.1292	14 55 21.2	9.046	17	11 48 15.67	2.1407	6 15 42.2	12.332
18	10 8 15.79	2.1287	14 46 15.9	9.130	18	11 50 24.15	2.1420	6 3 20.8	12.381
19	10 10 23.50	2.1282	14 37 5.6	9.213	19	11 52 32.71	2.1434	5 50 56.5	12.429
20	10 12 31.18	2.1277	14 27 50.3	9.296	20	11 54 41.36	2.1448	5 38 29.3	12.477
21	10 14 38.83	2.1272	14 18 30.1	9.378	21	11 56 50.09	2.1462	5 25 59.3	12.523
22	10 16 46.45	2.1268	14 9 4.9	9.460	22	11 58 58.91	2.1477	5 13 26.6	12.568
23	10 18 54.05	2.1264	N. 13 59 34.9	9.541	23	12 1 7.82	2.1493	N. 5 0 51.2	12.613
MONDAY 26.					WEDNESDAY 28.				
0	10 21 1.62	2.1260	N. 13 50 0.0	9.622	0	12 3 16.83	2.1510	N. 4 48 13.1	12.657
1	10 23 9.17	2.1257	13 40 20.3	9.709	1	12 5 25.94	2.1527	4 35 32.4	12.699
2	10 25 16.70	2.1253	13 30 35.8	9.781	2	12 7 35.15	2.1544	4 22 49.2	12.740
3	10 27 24.21	2.1250	13 20 46.6	9.859	3	12 9 44.47	2.1562	4 10 3.6	12.780
4	10 29 31.70	2.1247	13 10 52.7	9.937	4	12 11 53.90	2.1581	3 57 15.6	12.820
5	10 31 39.18	2.1245	13 0 54.1	10.015	5	12 14 3.44	2.1599	3 44 25.2	12.858
6	10 33 46.64	2.1242	12 50 50.9	10.092	6	12 16 13.09	2.1618	3 31 32.6	12.895
7	10 35 54.08	2.1240	12 40 43.1	10.168	7	12 18 22.86	2.1636	3 18 37.8	12.932
8	10 38 1.52	2.1239	12 30 30.7	10.244	8	12 20 32.76	2.1660	3 5 40.8	12.967
9	10 40 8.95	2.1238	12 20 13.8	10.319	9	12 22 42.78	2.1681	2 52 41.7	13.001
10	10 42 16.37	2.1237	12 9 52.4	10.393	10	12 24 52.93	2.1703	2 39 40.7	13.034
11	10 44 23.79	2.1237	11 59 26.6	10.467	11	12 27 3.22	2.1726	2 26 37.7	13.066
12	10 46 31.21	2.1236	11 48 56.4	10.540	12	12 29 13.65	2.1749	2 13 32.8	13.097
13	10 48 38.62	2.1236	11 38 21.8	10.612	13	12 31 24.21	2.1772	2 0 26.1	13.126
14	10 50 46.04	2.1237	11 27 42.9	10.683	14	12 33 34.92	2.1797	1 47 17.7	13.154
15	10 52 53.46	2.1237	11 16 59.8	10.753	15	12 35 45.78	2.1822	1 34 7.6	13.182
16	10 55 0.89	2.1238	11 6 12.5	10.824	16	12 37 56.79	2.1847	1 20 55.9	13.208
17	10 57 8.32	2.1239	10 55 20.9	10.895	17	12 40 7.95	2.1873	1 7 42.6	13.233
18	10 59 15.76	2.1241	10 44 25.1	10.964	18	12 42 19.27	2.1900	0 54 27.9	13.257
19	11 1 23.21	2.1243	10 33 25.2	11.032	19	12 44 30.75	2.1928	0 41 11.8	13.279
20	11 3 30.68	2.1246	10 22 21.3	11.099	20	12 46 42.40	2.1956	0 27 54.4	13.300
21	11 5 38.17	2.1250	10 11 13.4	11.165	21	12 48 54.22	2.1984	0 14 35.8	13.320
22	11 7 45.68	2.1253	10 0 1.5	11.231	22	12 51 6.21	2.2013	N. 0 1 16.0	13.339
23	11 9 53.21	2.1257	9 48 45.7	11.297	23	12 53 18.37	2.2042	S. 0 12 4.9	13.357
24	11 12 0.77	2.1262	N. 9 37 25.9	11.362	24	12 55 30.71	2.2072	S. 0 25 26.8	13.372

GREENWICH MEAN TIME.																													
THE MOON'S RIGHT ASCENSION AND DECLINATION.																													
Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.																				
THURSDAY 29.					SATURDAY, DECEMBER 1.																								
0	12 55 30.71	2.2072	S. 0° 25' 26.8"	13.373	0	14 45 59.05	2.4139	S. 10° 58' 24.6"	12.389																				
1	12 57 43.24	2.2103	0 38 49.6	13.388	<div>PHASES OF THE MOON.</div> <table><tr><td>● New Moon</td><td>. . . Nov.</td><td>d</td><td>h</td><td>m</td></tr><tr><td>☾ First Quarter</td><td>. . .</td><td>10</td><td>4</td><td>15.7</td></tr><tr><td>○ Full Moon</td><td>. . .</td><td>18</td><td>3</td><td>15.9</td></tr><tr><td>☾ Last Quarter</td><td>. . .</td><td>26</td><td>5</td><td>20.4</td></tr></table>					● New Moon	. . . Nov.	d	h	m	☾ First Quarter	. . .	10	4	15.7	○ Full Moon	. . .	18	3	15.9	☾ Last Quarter	. . .	26	5	20.4
● New Moon	. . . Nov.	d	h	m																									
☾ First Quarter	. . .	10	4	15.7																									
○ Full Moon	. . .	18	3	15.9																									
☾ Last Quarter	. . .	26	5	20.4																									
2	12 59 55.95	2.2134	0 52 13.3	13.402																									
3	13 2 8.85	2.2166	1 5 37.6	13.413																									
4	13 4 21.95	2.2199	1 19 2.9	13.424																									
5	13 6 35.24	2.2232	1 32 28.7	13.434																									
6	13 8 48.73	2.2266	1 45 55.0	13.442																									
7	13 11 2.43	2.2301	1 59 21.8	13.449																									
8	13 13 16.34	2.2335	2 12 48.9	13.454																									
9	13 15 30.45	2.2370	2 26 16.3	13.458																									
10	13 17 44.78	2.2406	2 39 43.9	13.461	<table><tr><td>☾ Perigee.</td><td>. . . Nov.</td><td>d</td><td>h</td></tr><tr><td>☾ Apogee.</td><td>. . .</td><td>18</td><td>16.2</td></tr></table>					☾ Perigee.	. . . Nov.	d	h	☾ Apogee.	. . .	18	16.2												
☾ Perigee.	. . . Nov.	d	h																										
☾ Apogee.	. . .	18	16.2																										
11	13 19 59.33	2.2443	2 53 11.6	13.462																									
12	13 22 14.10	2.2480	3 6 39.4	13.469																									
13	13 24 29.09	2.2518	3 20 7.1	13.480																									
14	13 26 44.31	2.2557	3 33 34.6	13.457																									
15	13 28 59.77	2.2596	3 47 1.9	13.453																									
16	13 31 15.46	2.2635	4 0 28.9	13.447																									
17	13 33 31.39	2.2675	4 13 55.5	13.438																									
18	13 35 47.56	2.2715	4 27 21.5	13.418																									
19	13 38 3.97	2.2756	4 40 46.9	13.418																									
20	13 40 20.63	2.2798	4 54 11.7	13.407																									
21	13 42 37.54	2.2840	5 7 35.7	13.393																									
22	13 44 54.71	2.2882	5 20 58.8	13.377																									
23	13 47 12.13	2.2925	S. 5° 34' 20.9"	13.360																									
FRIDAY 30.																													
0	13 49 29.81	2.2968	S. 5° 47' 42.0"	13.342																									
1	13 51 47.75	2.3012	6 1 1.9	13.321																									
2	13 54 5.96	2.3057	6 14 20.5	13.299																									
3	13 56 24.44	2.3102	6 27 37.8	13.276																									
4	13 58 43.19	2.3148	6 40 53.6	13.250																									
5	14 1 2.22	2.3194	6 54 7.8	13.223																									
6	14 3 21.52	2.3240	7 7 20.4	13.195																									
7	14 5 41.10	2.3287	7 20 31.2	13.165																									
8	14 8 0.96	2.3334	7 33 40.2	13.133																									
9	14 10 21.11	2.3382	7 46 47.2	13.099																									
10	14 12 41.54	2.3430	7 59 52.1	13.063																									
11	14 15 2.27	2.3479	8 12 54.8	13.027																									
12	14 17 23.29	2.3528	8 25 55.3	12.988																									
13	14 19 44.60	2.3577	8 38 53.4	12.947																									
14	14 22 6.21	2.3627	8 51 49.0	12.905																									
15	14 24 28.12	2.3677	9 4 42.0	12.861																									
16	14 26 50.33	2.3727	9 17 32.3	12.815																									
17	14 29 12.84	2.3778	9 30 19.8	12.767																									
18	14 31 35.66	2.3829	9 43 4.4	12.718																									
19	14 33 58.79	2.3880	9 55 46.0	12.667																									
20	14 36 22.22	2.3931	10 8 24.4	12.613																									
21	14 38 45.96	2.3982	10 20 59.6	12.558																									
22	14 41 10.01	2.4034	10 33 31.4	12.502																									
23	14 43 34.37	2.4087	10 45 59.8	12.443																									
24	14 45 59.05	2.4139	S. 10° 58' 24.6"	12.389																									

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Pollux W.	72° 29' 31"	2219	74° 17' 30"	2203	76° 5' 53"	2187	77° 54' 40"	2171
	Regulus W.	36 29 32	2195	38 18 7	2178	40 7 8	2162	41 56 33	2147
	SUN E.	35 13 53	2545	33 33 43	2533	31 53 15	2521	30 12 31	2519
5	SUN W.	21 40 41	2398	23 24 19	2391	25 8 6	2388	26 51 58	2387
	Fomalhaut E.	88 57 13	2210	87 9 1	2218	85 21 0	2227	83 33 12	2236
	α Pegasi E.	104 42 11	2401	102 58 38	2401	101 15 5	2403	99 31 35	2407
6	SUN W.	35 30 39	2412	37 13 57	2420	38 57 3	2430	40 39 55	2441
	Fomalhaut E.	74 38 14	2300	72 52 14	2316	71 6 38	2333	69 21 27	2352
	α Pegasi E.	90 56 3	2446	89 13 34	2458	87 31 22	2471	85 49 28	2486
7	SUN W.	49 9 58	2507	50 51 1	2522	52 31 44	2538	54 12 5	2553
	JUPITER W.	24 21 43	2368	26 8 29	2379	27 54 59	2391	29 41 11	2404
	VENUS W.	18 37 22	2672	20 14 39	2672	21 51 57	2675	23 29 11	2681
	Fomalhaut E.	60 42 50	2463	59 0 45	2490	57 19 18	2518	55 38 30	2548
	α Pegasi E.	77 25 38	2576	75 46 10	2598	74 7 12	2621	72 28 45	2645
8	SUN W.	62 28 13	2638	64 6 17	2655	65 43 57	2673	67 21 13	2690
	JUPITER W.	38 27 4	2380	40 11 8	2396	41 54 49	2412	43 38 7	2428
	VENUS W.	31 32 25	2738	33 8 14	2753	34 43 44	2769	36 18 53	2784
	Fomalhaut E.	47 25 32	2725	45 49 26	2769	44 14 18	2816	42 40 11	2866
	α Pegasi E.	64 25 13	2786	62 50 27	2818	61 16 23	2852	59 43 3	2888
9	SUN W.	75 21 35	2781	76 56 28	2799	78 30 57	2818	80 5 2	2836
	JUPITER W.	52 8 43	2512	53 49 39	2530	55 30 11	2546	57 10 20	2563
	VENUS W.	44 9 22	2868	45 42 22	2885	47 15 0	2902	48 47 16	2920
	MARS W.	20 11 29	2714	21 47 50	2728	23 23 53	2741	24 59 38	2756
	Fomalhaut E.	35 7 31	3196	33 41 17	3285	32 16 48	3386	30 54 15	3498
	α Pegasi E.	52 8 41	3101	50 40 33	3152	49 13 26	3206	47 47 24	3264
	α Arietis E.	93 17 25	2583	91 38 6	2600	89 59 11	2617	88 20 39	2634
10	SUN W.	87 49 41	2924	89 21 30	2941	90 52 57	2958	92 24 2	2975
	JUPITER W.	65 25 22	2646	67 3 15	2661	68 40 47	2678	70 17 57	2692
	VENUS W.	56 23 4	3006	57 53 9	3023	59 22 53	3039	60 52 17	3056
	MARS W.	32 53 20	2835	34 27 3	2851	36 0 25	2866	37 33 27	2882
	α Arietis E.	80 13 49	2721	78 37 37	2739	77 1 49	2756	75 26 24	2775
	Aldebaran E.	111 31 46	2569	109 52 9	2585	108 12 54	2601	106 34 0	2617
11	SUN W.	99 54 19	3055	101 23 24	3070	102 52 10	3086	104 20 37	3101
	JUPITER W.	78 18 41	2768	79 53 51	2782	81 28 43	2796	83 3 16	2810
	VENUS W.	68 14 14	3137	69 41 39	3152	71 8 46	3166	72 35 36	3180
	MARS W.	45 13 42	2958	46 44 47	2973	48 15 31	2988	49 46 4	3000
	α Aquilæ W.	42 46 10	4297	43 53 5	4318	45 1 14	4149	46 10 29	4085
	α Arietis E.	67 35 15	2866	66 2 12	2884	64 29 33	2903	62 57 18	2922
	Aldebaran E.	98 24 42	2690	96 47 49	2704	95 11 15	2718	93 34 59	2732
12	SUN W.	111 38 28	3170	113 5 13	3183	114 31 42	3196	115 57 56	3209
	JUPITER W.	90 51 40	2874	92 24 32	2886	93 57 9	2898	95 29 31	2909
	VENUS W.	79 45 30	3250	81 10 40	3262	82 35 36	3275	84 0 17	3287
	MARS W.	57 14 19	3067	58 43 9	3078	60 11 45	3091	61 40 6	3102
	α Aquilæ W.	52 10 2	3961	53 24 1	3929	54 38 33	3902	55 53 33	3777

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVb.	P. L. of Diff.	XVIIIb.	P. L. of Diff.	XXIb.	P. L. of Diff.
1	Pollux	W.	79° 43' 51"	2156	81° 33' 25"	2142	83° 23' 20"	2128	85° 13' 36"	2115
	Regulus	W.	43 46 21	2132	45 36 32	2117	47 27 6	2103	49 18 1	2090
	SUN	E.	28 31 34	2503	26 50 25	2497	25 9 7	2494	23 27 45	2494
5	SUN	W.	28 35 52	2388	30 19 44	2391	32 3 31	2397	33 47 10	2404
	Fomalhaut	E.	81 45 38	2346	79 58 19	2358	78 11 18	2271	76 24 36	2285
	α Pegasi	E.	97 48 10	2412	96 4 52	2419	94 21 44	2426	92 38 47	2436
6	SUN	W.	42 22 31	2453	44 4 50	2465	45 46 52	2479	47 28 35	2493
	Fomalhaut	E.	67 36 43	2373	65 52 28	2393	61 8 43	2415	62 25 30	2438
	α Pegasi	E.	84 7 55	2502	82 26 44	2518	80 45 56	2537	79 5 34	2556
7	SUN	W.	55 52 4	2569	57 31 41	2586	59 10 55	2603	60 49 46	2621
	JUPITER	W.	31 27 4	2318	33 12 37	2333	34 57 48	2348	36 42 37	2364
	VENUS	W.	25 6 17	2689	26 43 12	2699	28 19 53	2711	29 56 18	2725
	Fomalhaut	E.	53 58 23	2579	52 18 59	2612	50 40 21	2648	49 2 31	2686
	α Pegasi	E.	70 50 51	2670	69 13 31	2697	67 36 47	2735	66 0 40	2755
8	SUN	W.	68 58 6	2708	70 34 35	2727	72 10 39	2745	73 46 19	2763
	JUPITER	W.	45 21 2	2445	47 3 33	2462	48 45 40	2479	50 27 23	2495
	VENUS	W.	37 53 42	2600	39 28 10	2617	41 2 16	2634	42 36 0	2651
	Fomalhaut	E.	41 7 8	2920	39 35 15	2980	38 4 37	3045	36 35 20	3117
	α Pegasi	E.	58 10 29	2927	56 38 44	2966	55 7 49	3009	53 37 47	3054
9	SUN	W.	81 38 43	2854	83 12 1	2871	84 44 57	2889	86 17 30	2906
	JUPITER	W.	58 50 6	2590	60 29 29	2596	62 8 29	2612	63 47 7	2629
	VENUS	W.	50 19 9	2938	51 50 40	2954	53 21 50	2972	54 52 38	2989
	MARS	W.	26 35 3	2772	28 10 8	2787	29 44 53	2803	31 19 17	2819
	Fomalhaut	E.	29 33 49	3627	28 15 44	3776	27 0 17	3948	25 47 46	4149
	α Pegasi	E.	46 22 30	3325	44 58 48	3393	43 36 23	3465	42 15 20	3544
	α Arietis	E.	86 42 30	2652	85 4 45	2669	83 27 23	2686	81 50 24	2704
10	SUN	W.	93 54 46	2992	95 25 9	3008	96 55 12	3024	98 24 55	3039
	JUPITER	W.	71 54 47	2708	73 31 16	2724	75 7 21	2739	76 43 12	2753
	VENUS	W.	62 21 20	3073	63 50 3	3089	65 18 26	3105	66 46 30	3121
	MARS	W.	39 6 9	2897	40 38 32	2912	42 10 35	2928	43 42 18	2943
	α Arietis	E.	73 51 23	2793	72 16 46	2811	70 42 32	2829	69 8 42	2847
	Aldebaran	E.	104 55 28	2632	103 17 16	2647	101 39 25	2662	100 1 54	2676
11	SUN	W.	105 48 45	3115	107 16 36	3129	108 44 10	3143	110 11 27	3157
	JUPITER	W.	84 37 31	2824	86 11 28	2837	87 45 8	2849	89 18 32	2862
	VENUS	W.	74 2 9	3195	75 28 24	3209	76 54 22	3223	78 20 4	3236
	MARS	W.	51 16 17	3014	52 46 13	3027	54 15 52	3041	55 45 14	3055
	α Aquilæ	W.	47 20 45	4030	48 31 55	3979	49 43 55	3935	50 56 39	3897
	α Arietis	E.	61 25 27	2941	59 54 0	2961	58 22 58	2980	56 52 20	3000
	Aldebaran	E.	91 59 2	2745	90 23 22	2758	88 47 59	2770	87 12 52	2783
12	SUN	W.	117 23 55	3220	118 49 40	3232	120 15 11	3244	121 40 28	3256
	JUPITER	W.	97 1 38	2920	98 33 31	2931	100 5 11	2942	101 26 37	2952
	VENUS	W.	85 24 44	3299	86 48 57	3311	88 12 56	3322	89 36 42	3332
	MARS	W.	63 8 13	3114	61 36 6	3125	66 3 45	3136	67 31 11	3146
	α Aquilæ	W.	57 8 59	3755	58 24 48	3735	59 40 58	3717	60 57 27	3702



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
12	$\alpha$ Arietis	E.	55° 22' 7"	3021	53° 52' 20"	3042	52° 22' 59"	3063	50° 54' 4"	3086
	Aldebaran	E.	85 38 2	2795	84 3 28	2807	82 29 9	2818	80 55 5	2829
13	SUN	W.	123 5 31	3267	124 30 21	3277	125 54 59	3288	127 19 25	3298
	VENUS	W.	91 0 16	3343	92 23 38	3353	93 46 48	3364	95 9 46	3373
	MARS	W.	68 58 25	3156	70 25 27	3166	71 52 17	3176	73 18 55	3186
	$\alpha$ Aquilæ	W.	62 14 12	3688	63 31 12	3676	64 48 25	3665	66 5 49	3656
	$\alpha$ Arietis	E.	43 36 43	3214	42 10 50	3243	40 45 32	3275	39 20 51	3309
	Aldebaran	E.	73 8 12	2850	71 35 28	2890	70 2 56	2900	68 30 37	2909
14	VENUS	W.	102 1 58	3417	103 23 55	3425	104 45 43	3439	106 7 23	3440
	MARS	W.	80 29 25	3227	81 55 2	3235	83 20 30	3249	84 45 49	3249
	$\alpha$ Aquilæ	W.	72 34 54	3626	73 53 0	3623	75 11 10	3620	76 29 23	3619
	Fomalhaut	W.	37 28 16	3564	38 47 30	3531	40 7 20	3509	41 27 42	3477
	Aldebaran	E.	60 51 41	2949	59 20 24	2956	57 49 16	2962	56 18 16	2969
15	MARS	W.	91 50 27	3281	93 15 1	3286	94 39 29	3291	96 3 51	3296
	$\alpha$ Aquilæ	W.	83 0 37	3621	84 18 49	3622	85 37 0	3624	86 55 8	3627
	Fomalhaut	W.	48 15 32	3389	49 38 1	3377	51 0 44	3366	52 23 39	3357
	$\alpha$ Pegasi	W.	36 21 10	4287	37 28 15	4205	38 36 36	4134	39 46 5	4070
	Aldebaran	E.	48 45 18	3000	47 15 5	3005	45 44 58	3010	44 14 58	3015
	Pollux	E.	92 58 42	3026	91 29 1	3031	89 59 27	3036	88 29 59	3041
16	Fomalhaut	W.	59 20 38	3323	60 44 23	3318	62 8 14	3313	63 32 11	3308
	$\alpha$ Pegasi	W.	45 47 21	3832	47 1 50	3798	48 16 54	3767	49 32 31	3738
	Aldebaran	E.	36 46 26	3038	35 17 0	3043	33 47 40	3046	32 18 24	3050
	Pollux	E.	81 4 3	3062	79 35 7	3066	78 6 16	3070	76 37 30	3073
	SATURN	E.	108 51 45	3042	107 22 24	3046	105 53 8	3049	104 23 56	3052
17	Fomalhaut	W.	70 32 54	3285	71 57 11	3293	73 21 31	3299	74 45 52	3290
	$\alpha$ Pegasi	W.	55 57 18	3629	57 15 21	3612	58 33 42	3597	59 52 20	3583
	Pollux	E.	69 14 40	3090	67 46 18	3092	66 17 59	3095	64 49 43	3098
	SATURN	E.	96 58 47	3065	95 29 55	3067	94 1 5	3069	92 32 17	3071
	Regulus	E.	105 0 26	3059	103 31 26	3061	102 2 29	3063	100 33 34	3065
18	Fomalhaut	W.	81 48 1	3285	83 12 30	3285	84 36 59	3284	86 1 29	3284
	$\alpha$ Pegasi	W.	66 28 55	3528	67 48 48	3519	69 8 51	3511	70 29 3	3504
	Pollux	E.	57 29 14	3111	56 1 18	3113	54 33 24	3115	53 5 33	3118
	SATURN	E.	85 8 48	3077	83 40 10	3078	82 11 34	3079	80 42 59	3079
	Regulus	E.	93 9 29	3072	91 40 45	3073	90 12 2	3073	88 43 19	3073
19	Fomalhaut	W.	93 3 59	3285	94 28 28	3285	95 52 57	3286	97 17 25	3286
	$\alpha$ Pegasi	W.	77 11 53	3474	78 32 46	3471	79 53 43	3466	81 14 45	3463
	$\alpha$ Arietis	W.	33 38 10	3578	34 57 8	3542	36 16 46	3509	37 37 0	3480
	Pollux	E.	45 47 3	3131	44 19 31	3133	42 52 2	3136	41 24 36	3139
	SATURN	E.	73 20 7	3079	71 51 32	3079	70 22 57	3078	68 54 21	3078
	Regulus	E.	81 19 55	3074	79 51 14	3074	78 22 33	3073	76 53 51	3073
20	$\alpha$ Arietis	W.	44 25 24	3370	45 48 15	3352	47 11 26	3337	48 34 55	3323
	Pollux	E.	34 8 37	3163	32 41 43	3169	31 14 57	3177	29 48 20	3185
	SATURN	E.	61 31 4	3071	60 2 19	3069	58 33 32	3067	57 4 42	3065
	Regulus	E.	69 30 6	3067	68 1 16	3065	66 32 24	3064	65 3 30	3062

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
12	$\alpha$ Arietis E.	49° 25' 37"	3109	47° 57' 38"	3133	46° 30' 9"	3158	45° 3' 10"	3185
	Aldebaran E.	79 21 15	2840	77 47 39	2851	76 14 17	2861	74 41 8	2871
13	SUN W.	128 43 39	3308	130 7 41	3318	131 31 32	3327	132 55 12	3336
	VENUS W.	96 32 33	3382	97 55 10	3392	99 17 36	3400	100 39 52	3409
	MARS W.	74 45 21	3194	76 11 37	3203	77 37 43	3211	79 3 39	3220
	$\alpha$ Aquilæ W.	67 23 23	3648	68 41 6	3641	69 58 56	3635	71 16 52	3630
	$\alpha$ Arietis E.	37 56 50	3346	36 33 32	3387	35 11 1	3431	33 49 20	3481
	Aldebaran E.	66 58 29	2917	65 26 32	2925	63 54 45	2933	62 23 8	2941
14	VENUS W.	107 28 54	3447	108 50 17	3454	110 11 32	3461	111 32 40	3467
	MARS W.	86 11 0	3256	87 36 3	3263	89 0 58	3269	90 25 46	3275
	$\alpha$ Aquilæ W.	77 47 37	3618	79 5 52	3617	80 24 8	3618	81 42 23	3619
	Fomalhaut W.	42 48 32	3455	44 9 46	3436	45 31 22	3418	46 53 18	3402
	Aldebaran E.	54 47 24	2976	53 16 41	2982	51 46 6	2988	50 15 38	2994
15	MARS W.	97 28 7	3300	98 52 18	3306	100 16 23	3311	101 40 22	3315
	$\alpha$ Aquilæ W.	88 13 13	3631	89 31 14	3635	90 49 10	3640	92 7 1	3646
	Fomalhaut W.	53 46 45	3348	55 10 1	3340	56 33 26	3333	57 56 59	3328
	$\alpha$ Pegasi W.	40 56 36	4012	42 8 4	3959	43 20 24	3913	44 33 31	3870
	Aldebaran E.	42 45 4	3020	41 15 16	3025	39 45 31	3029	38 15 57	3034
	Pollux E.	87 0 37	3046	85 31 21	3050	84 2 10	3054	82 33 4	3058
16	Fomalhaut W.	64 56 13	3306	66 20 18	3302	67 44 27	3300	69 8 39	3297
	$\alpha$ Pegasi W.	50 48 38	3711	52 5 13	3688	53 22 13	3667	54 39 35	3648
	Aldebaran E.	30 49 13	3054	29 20 7	3057	27 51 5	3061	26 22 8	3065
	Pollux E.	75 8 48	3077	73 40 10	3080	72 11 36	3083	70 43 6	3087
	SATURN E.	102 54 47	3055	101 25 42	3057	99 56 40	3060	98 27 42	3063
17	Fomalhaut W.	76 10 15	3288	77 34 40	3288	78 59 6	3287	80 23 33	3286
	$\alpha$ Pegasi W.	61 11 13	3570	62 30 20	3558	63 49 40	3547	65 9 12	3537
	Pollux E.	63 21 31	3101	61 53 22	3103	60 25 16	3105	58 57 13	3109
	SATURN E.	91 3 32	3073	89 34 49	3073	88 6 7	3075	86 37 27	3076
	Regulus E.	99 4 41	3067	97 35 51	3068	96 7 2	3069	94 38 15	3070
18	Fomalhaut W.	87 25 59	3284	88 50 29	3284	90 14 59	3284	91 39 29	3284
	$\alpha$ Pegasi W.	71 49 23	3497	73 9 50	3490	74 30 25	3485	75 51 6	3480
	Pollux E.	51 37 45	3120	50 10 0	3123	48 42 18	3125	47 14 39	3128
	SATURN E.	79 14 24	3079	77 45 49	3080	76 17 15	3080	74 48 41	3080
	Regulus E.	87 14 37	3074	85 45 56	3075	84 17 16	3075	82 48 36	3074
19	Fomalhaut W.	98 41 53	3287	100 6 20	3288	101 30 45	3289	102 55 9	3290
	$\alpha$ Pegasi W.	82 35 51	3459	83 57 1	3455	85 18 15	3453	86 39 32	3450
	$\alpha$ Arietis W.	38 57 47	3454	40 19 3	3430	41 40 46	3408	43 2 54	3388
	Pollux E.	39 57 14	3143	38 29 57	3148	37 2 45	3152	35 35 38	3157
	SATURN E.	67 25 44	3077	65 57 6	3076	64 28 27	3074	62 59 46	3073
	Regulus E.	75 25 9	3073	73 56 25	3071	72 27 40	3070	70 58 54	3069
20	$\alpha$ Arietis W.	49 58 40	3309	51 22 41	3306	52 46 57	3283	54 11 28	3271
	Pollux E.	28 21 53	3196	26 55 31	3200	25 29 10	3224	24 3 59	3243
	SATURN E.	55 35 50	3065	51 6 55	3080	52 37 56	3057	51 8 54	3054
	Regulus E.	63 31 34	3060	62 5 35	3058	60 36 32	3054	59 7 26	3051

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
21	$\alpha$ Arietis	W.	55 36 13	3280	57 1 11	3250	58 26 21	3239	59 51 44	3230
	Aldebaran	W.	22 40 43	3057	24 9 45	3052	25 38 54	3047	27 8 9	3041
	SATURN	E.	49 39 48	3051	48 10 38	3047	46 41 23	3043	45 12 4	3039
	Regulus	E.	57 38 16	3048	56 9 3	3044	54 39 45	3041	53 10 23	3037
22	$\alpha$ Arietis	W.	67 1 31	3182	68 28 2	3172	69 54 45	3163	71 21 39	3154
	Aldebaran	W.	34 36 5	3013	36 6 2	3007	37 36 6	3001	39 6 18	2993
	SATURN	E.	37 44 8	3015	36 14 14	3010	34 44 14	3005	33 14 7	2998
	Regulus	E.	45 42 16	3014	44 12 21	3009	42 42 20	3004	41 12 12	2998
	Spica	E.	99 38 58	3041	98 9 36	3035	96 40 7	3029	95 10 30	3022
23	$\alpha$ Arietis	W.	78 38 53	3107	80 6 54	3097	81 35 7	3088	83 3 31	3078
	Aldebaran	W.	46 39 31	2957	48 10 38	2948	49 41 56	2939	51 13 25	2931
	Regulus	E.	33 39 42	2967	32 8 48	2960	30 37 45	2953	29 6 33	2946
	Spica	E.	87 40 19	2986	86 9 49	2978	84 39 9	2970	83 8 19	2962
	SUN	E.	127 3 26	3347	125 40 9	3338	124 16 41	3327	122 53 1	3317
24	Aldebaran	W.	58 53 48	2881	60 26 31	2870	61 59 28	2859	63 32 40	2847
	Spica	E.	75 31 20	2915	73 59 20	2905	72 27 7	2894	70 54 40	2883
	SUN	E.	115 51 38	3262	114 26 42	3249	113 1 31	3237	111 36 6	3225
25	Aldebaran	W.	71 22 33	2784	72 57 22	2771	74 32 28	2754	76 7 53	2743
	Pollux	W.	27 50 6	2915	29 22 6	2889	30 54 39	2865	32 27 43	2841
	Spica	E.	63 8 53	2825	61 34 58	2814	60 0 48	2801	58 26 21	2788
	SUN	E.	104 25 3	3155	102 58 0	3140	101 30 39	3125	100 3 0	3110
26	Aldebaran	W.	84 9 47	2667	85 47 11	2652	87 24 56	2635	89 3 3	2618
	Pollux	W.	40 20 21	2735	41 56 15	2714	43 32 36	2694	45 9 24	2675
	Spica	E.	50 29 58	2794	48 53 50	2711	47 17 25	2699	45 40 44	2687
	SUN	E.	92 39 51	3027	91 10 12	3009	89 40 11	2992	88 9 48	2974
27	Aldebaran	W.	97 19 23	2533	98 59 50	2516	100 40 41	2498	102 21 57	2481
	Pollux	W.	53 20 1	2577	54 59 28	2557	56 39 22	2538	58 19 43	2519
	SATURN	W.	25 2 41	2541	26 42 57	2532	28 23 39	2504	30 4 47	2485
	Regulus	W.	17 18 29	2577	18 57 55	2552	20 37 56	2528	22 18 30	2506
	Spica	E.	37 33 10	2629	35 54 54	2620	34 16 26	2611	32 37 46	2604
	SUN	E.	80 32 13	2882	78 59 31	2863	77 26 25	2844	75 52 54	2825
28	Pollux	W.	66 48 10	2422	68 31 13	2403	70 14 43	2385	71 58 39	2366
	SATURN	W.	38 36 59	2393	40 20 44	2374	42 4 56	2356	43 49 34	2337
	Regulus	W.	30 48 47	2404	32 32 16	2384	34 16 14	2364	36 0 40	2346
	SUN	E.	67 59 2	2728	66 22 59	2708	64 46 30	2689	63 9 35	2670
29	Pollux	W.	80 45 1	2276	82 31 36	2259	84 18 36	2241	86 6 2	2225
	SATURN	W.	52 39 20	2248	54 26 36	2231	56 14 17	2214	58 2 23	2198
	Regulus	W.	44 49 35	2254	46 36 42	2237	48 24 15	2219	50 12 14	2202
	SUN	E.	54 58 39	2577	53 19 13	2559	51 39 22	2541	49 59 6	2524
30	Pollux	W.	95 9 11	2149	96 58 57	2134	98 49 5	2120	100 39 33	2108
	SATURN	W.	67 8 59	2120	68 59 28	2105	70 50 19	2092	72 41 30	2079
	Regulus	W.	59 18 18	2124	61 8 41	2109	62 59 26	2096	64 50 32	2083
	SUN	E.	41 32 0	2445	39 49 30	2431	38 6 40	2419	36 23 32	2406

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
21	$\alpha$ Arietis	W.	61° 17' 18"	3920	62° 43' 4"	3909	64° 9' 2"	3900	65° 35' 11"	3191
	Aldebaran	W.	28 37 31	3036	30 6 59	3030	31 36 34	3025	33 6 16	3019
	SATURN	E.	43 42 40	3035	42 13 11	3030	40 43 36	3026	39 13 55	3021
	Regulus	E.	51 40 56	3033	50 11 24	3029	48 41 47	3024	47 12 4	3020
22	$\alpha$ Arietis	W.	72 48 43	3144	74 15 59	3135	75 43 26	3126	77 11 4	3117
	Aldebaran	W.	40 36 39	2987	42 7 8	2980	43 37 46	2972	45 8 34	2965
	SATURN	E.	31 43 52	2993	30 13 30	2985	28 42 59	2979	27 12 20	2972
	Regulus	E.	39 41 57	2993	38 11 35	2986	36 41 5	2981	35 10 28	2973
	Spica	E.	93 40 45	3016	92 10 52	3009	90 40 50	3001	89 10 39	2994
23	$\alpha$ Arietis	W.	84 32 7	3069	86 0 55	3058	87 29 56	3048	88 59 9	3038
	Aldebaran	W.	52 45 5	2921	54 16 57	2912	55 49 1	2901	57 21 18	2891
	Regulus	E.	27 35 13	2939	26 3 44	2939	24 32 6	2925	23 0 19	2919
	Spica	E.	81 37 18	2953	80 6 6	2944	78 34 43	2935	77 3 8	2924
	SUN	E.	121 29 9	3306	120 5 5	3296	118 40 49	3285	117 16 20	3274
24	Aldebaran	W.	65 6 7	2835	66 39 49	2823	68 13 47	2810	69 48 2	2798
	Spica	E.	69 22 0	2873	67 49 6	2861	66 15 57	2849	61 42 33	2837
	SUN	E.	110 10 26	3211	108 44 30	3198	107 18 18	3183	105 51 49	3169
25	Aldebaran	W.	77 43 36	2729	79 19 38	2713	80 56 0	2698	82 32 43	2682
	Pollux	W.	34 1 18	2818	35 35 22	2797	37 9 54	2775	38 44 54	2755
	Spica	E.	56 51 38	2775	55 16 38	2763	53 41 22	2750	52 5 49	2737
	SUN	E.	98 35 2	3093	97 6 44	3078	95 38 6	3060	94 9 9	3044
26	Aldebaran	W.	90 41 33	2602	92 20 25	2585	93 59 41	2568	95 39 20	2551
	Pollux	W.	46 46 38	2655	48 24 19	2635	50 2 26	2615	51 41 0	2596
	Spica	E.	44 3 46	2674	42 26 31	2661	40 48 59	2650	39 11 12	2639
	SUN	E.	86 39 3	2956	85 7 55	2939	83 36 25	2920	82 4 31	2901
27	Aldebaran	W.	104 3 37	2492	105 45 43	2445	107 28 14	2426	109 11 11	2408
	Pollux	W.	60 0 30	2499	61 41 44	2480	63 23 25	2460	65 5 34	2441
	SATURN	W.	31 46 21	2467	33 28 21	2448	35 10 47	2429	36 53 40	2411
	Regulus	W.	23 59 35	2485	25 41 9	2464	27 23 13	2443	29 5 46	2424
	Spica	E.	30 58 57	2600	29 20 2	2598	27 41 4	2598	26 2 6	2602
	SUN	E.	74 18 58	2805	72 44 37	2786	71 9 51	2766	69 34 39	2747
28	Pollux	W.	73 43 2	2348	75 27 52	2329	77 13 9	2311	78 58 52	2294
	SATURN	W.	45 34 39	2320	47 20 10	2302	49 6 7	2281	50 52 30	2266
	Regulus	W.	37 45 33	2327	39 30 53	2309	41 16 40	2290	43 2 54	2272
	SUN	E.	61 32 15	2651	59 54 29	2632	58 16 18	2613	56 37 41	2595
29	Pollux	W.	87 53 52	2209	89 42 6	2192	91 30 45	2177	93 19 47	2163
	SATURN	W.	59 50 54	2181	61 39 50	2165	63 29 10	2150	65 18 53	2135
	Regulus	W.	52 0 38	2186	53 49 27	2170	55 38 40	2154	57 28 17	2138
	SUN	E.	48 18 26	2507	46 37 23	2491	44 55 57	2475	43 14 9	2460
30	Pollux	W.	102 30 20	2096	104 21 26	2081	106 12 50	2073	108 4 30	2061
	SATURN	W.	74 33 2	2066	76 24 54	2051	78 17 5	2043	80 9 34	2039
	Regulus	W.	66 41 58	2070	68 33 44	2057	70 25 49	2046	72 18 12	2035
	SUN	E.	34 40 6	2395	32 56 21	2384	31 12 26	2374	29 28 14	2366

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from		Diff. for 1 Hour.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Added to Apparent Time.				
Sat.	1	<sup>h</sup> 16 <sup>m</sup> 32 <sup>s</sup> 29.06	10.822	S. 21° 55' 43.0	-22.58	16' 16.08	70.36	<sup>m</sup> 10 <sup>s</sup> 34.44	0.961		
SUN.	2	16 36 49.13	10.848	22 4 32.4	21.52	16 16.22	70.44	10 10.99	0.930		
Mon.	3	16 41 9.82	10.873	22 12 56.3	20.45	16 16.36	70.52	9 46.93	1.014		
Tues.	4	16 45 31.09	10.897	22 20 54.3	-19.37	16 16.50	70.59	9 22.28	1.038		
Wed.	5	16 49 52.92	10.920	22 28 26.2	18.29	16 16.63	70.67	8 57.07	1.061		
Thur.	6	16 54 15.27	10.941	22 35 31.8	17.19	16 16.76	70.74	8 31.35	1.082		
Frid.	7	16 58 38.10	10.961	22 42 10.8	-16.08	16 16.89	70.81	8 5.15	1.102		
Sat.	8	17 3 1.40	10.980	22 48 22.9	14.96	16 17.01	70.87	7 38.48	1.121		
SUN.	9	17 7 25.14	10.997	22 54 8.1	13.83	16 17.13	70.93	7 11.37	1.138		
Mon.	10	17 11 49.27	11.013	22 59 26.0	-12.68	16 17.25	70.99	6 43.87	1.154		
Tues.	11	17 16 13.77	11.028	23 4 16.5	11.53	16 17.36	71.04	6 16.01	1.169		
Wed.	12	17 20 38.61	11.041	23 8 39.5	10.38	16 17.47	71.09	5 47.81	1.182		
Thur.	13	17 25 3.76	11.053	23 12 34.8	- 9.23	16 17.57	71.13	5 19.29	1.194		
Frid.	14	17 29 29.20	11.064	23 16 2.3	8.07	16 17.67	71.17	4 50.49	1.205		
Sat.	15	17 33 54.88	11.074	23 19 1.8	6.91	16 17.76	71.20	4 21.45	1.215		
SUN.	16	17 38 20.77	11.082	23 21 33.4	- 5.74	16 17.84	71.23	3 52.20	1.223		
Mon.	17	17 42 46.84	11.090	23 23 36.9	4.57	16 17.92	71.25	3 22.76	1.230		
Tues.	18	17 47 13.08	11.096	23 25 12.2	3.38	16 17.99	71.27	2 53.16	1.236		
Wed.	19	17 51 39.45	11.101	23 26 19.3	- 2.21	16 18.06	71.28	2 23.43	1.241		
Thur.	20	17 56 5.91	11.104	23 26 58.1	- 1.03	16 18.12	71.29	1 53.61	1.244		
Frid.	21	18 0 32.44	11.107	23 27 8.7	+ 0.15	16 18.17	71.30	1 23.72	1.247		
Sat.	22	18 4 59.02	11.108	23 26 51.1	+ 1.33	16 18.22	71.30	0 53.78	1.248		
SUN.	23	18 9 25.61	11.108	23 26 5.1	2.50	16 18.26	71.30	0 23.82	1.248		
Mon.	24	18 13 52.17	11.106	23 24 50.8	3.68	16 18.29	71.29	0 6.10	1.246		
Tues.	25	18 18 18.67	11.103	23 23 8.3	+ 4.85	16 18.32	71.28	0 35.96	1.243		
Wed.	26	18 22 45.08	11.098	23 20 57.6	6.03	16 18.35	71.26	1 5.73	1.238		
Thur.	27	18 27 11.37	11.092	23 18 18.7	7.20	16 18.37	71.24	1 35.38	1.232		
Frid.	28	18 31 37.50	11.085	23 15 11.8	+ 8.37	16 18.38	71.21	2 4.87	1.225		
Sat.	29	18 36 3.43	11.076	23 11 36.9	9.53	16 18.39	71.18	2 34.16	1.216		
SUN.	30	18 40 29.13	11.066	23 7 34.1	10.69	16 18.40	71.15	3 3.22	1.206		
Mon.	31	18 44 54.57	11.054	23 3 3.5	11.85	16 18.40	71.11	3 32.02	1.194		
Tues.	32	18 49 19.71	11.040	S. 22 58 5.2	+13.00	16 18.40	71.06	4 0.52	1.180		

NOTE.—The mean time of semidiameter passing may be found by subtracting 0.19 from the sidereal time.  
 The sign — prefixed to the hourly change of declination indicates that south declinations are increasing;  
 the sign + indicates that south declinations are decreasing.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be Added to		Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Subtracted from			
						Mean Time.			
Sat.	1	<sup>h</sup> 16 <sup>m</sup> 32 <sup>s</sup> 30.97	10.820	S. <sup>°</sup> 21 <sup>'</sup> 55 <sup>"</sup> 47.0	-22.57	<sup>m</sup> 10 <sup>s</sup> 34.27	0.964	<sup>h</sup> 16 <sup>m</sup> 43 <sup>s</sup> 5.24	
SUN.	2	16 36 50.98	10.846	22 4 36.1	21.51	10 10.82	0.990	16 47 1.80	
Mon.	3	16 41 11.59	10.870	22 12 59.6	20.44	9 46.76	1.014	16 50 58.35	
Tues.	4	16 45 32.79	10.894	22 20 57.3	-19.36	9 22.12	1.038	16 54 54.91	
Wed.	5	16 49 54.55	10.917	22 28 28.9	18.28	8 56.91	1.061	16 58 51.46	
Thur.	6	16 54 16.82	10.938	22 35 34.2	17.18	8 31.20	1.082	17 2 48.02	
Frid.	7	16 58 39.58	10.958	22 42 12.9	-16.07	8 5.00	1.102	17 6 44.58	
Sat.	8	17 3 2.80	10.977	22 48 24.8	14.95	7 38.34	1.121	17 10 41.14	
SUN.	9	17 7 26.46	10.994	22 54 9.7	13.82	7 11.23	1.138	17 14 37.69	
Mon.	10	17 11 50.51	11.010	22 59 27.4	-12.67	6 43.74	1.154	17 18 34.25	
Tues.	11	17 16 14.93	11.025	23 4 17.7	11.52	6 15.88	1.169	17 22 30.81	
Wed.	12	17 20 39.68	11.038	23 8 40.5	10.37	5 47.69	1.182	17 26 27.37	
Thur.	13	17 25 4.75	11.050	23 12 35.6	- 9.22	5 19.18	1.194	17 30 23.93	
Frid.	14	17 29 30.09	11.061	23 16 2.9	8.06	4 50.39	1.205	17 34 20.49	
Sat.	15	17 33 55.68	11.071	23 19 2.3	6.90	4 21.36	1.215	17 38 17.04	
SUN.	16	17 38 21.48	11.079	23 21 33.8	- 5.73	3 52.12	1.223	17 42 13.60	
Mon.	17	17 42 47.46	11.086	23 23 37.2	4.56	3 22.69	1.230	17 46 10.15	
Tues.	18	17 47 13.61	11.092	23 25 12.4	3.38	2 53.10	1.236	17 50 6.71	
Wed.	19	17 51 39.89	11.097	23 26 19.4	- 2.21	2 23.38	1.241	17 54 3.27	
Thur.	20	17 56 6.26	11.100	23 26 58.2	- 1.03	1 53.57	1.244	17 57 59.83	
Frid.	21	18 0 32.70	11.103	23 27 8.8	+ 0.15	1 23.69	1.247	18 1 56.39	
Sat.	22	18 4 59.19	11.104	23 26 51.1	+ 1.33	0 53.76	1.248	18 5 52.95	
SUN.	23	18 9 25.69	11.104	23 26 5.1	2.50	0 23.81	1.248	18 9 49.50	
Mon.	24	18 13 52.16	11.102	23 24 50.8	3.68	0 6.10	1.246	18 13 46.06	
Tues.	25	18 18 18.57	11.099	23 23 8.4	+ 4.85	0 35.95	1.243	18 17 42.62	
Wed.	26	18 22 44.88	11.094	23 20 57.7	6.03	1 5.71	1.238	18 21 39.18	
Thur.	27	18 27 11.08	11.088	23 18 18.9	7.20	1 35.35	1.232	18 25 35.73	
Frid.	28	18 31 37.12	11.081	23 15 12.1	+ 8.37	2 4.83	1.225	18 29 32.29	
Sat.	29	18 36 2.96	11.072	23 11 37.3	9.53	2 34.11	1.216	18 33 28.85	
SUN.	30	18 40 28.57	11.062	23 7 34.6	10.69	3 3.16	1.206	18 37 25.41	
Mon.	31	18 44 53.92	11.050	23 3 4.1	11.84	3 31.95	1.194	18 41 21.96	
Tues.	32	18 49 18.97	11.036	S. 22 58 6.0	+12.99	3 0.45	1.180	18 45 18.52	

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.  
 The sign — prefixed to the hourly change of declination indicates that south declinations are increasing; the sign + indicates that south declinations are decreasing.

Diff. for 1 Hour,  
 + 9<sup>s</sup>.8565.  
 (Table III.)

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.	
		TRUE LONGITUDE.		Diff. for 1 Hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	336	249° 47' 22".6	46' 53".3	152.24	+ 0.61	9.9936925	-27.0	7 <sup>h</sup> 15 <sup>m</sup> 43.18 <sup>s</sup>	
2	337	250 48 17.1	47 47.7	152.29	0.54	9.9936285	26.4	7 11 47.27	
3	338	251 49 12.8	48 43.2	152.34	0.45	9.9935658	25.8	7 7 51.36	
4	339	252 50 9.5	49 39.8	152.38	+ 0.34	9.9935046	-25.2	7 3 55.45	
5	240	253 51 7.2	50 37.3	152.42	0.21	9.9934447	24.6	6 59 59.54	
6	341	254 52 5.8	51 35.7	152.45	+ 0.08	9.9933862	24.0	6 56 3.63	
7	342	255 53 5.0	52 34.8	152.48	- 0.05	9.9933293	-23.4	6 52 7.72	
8	343	256 54 4.9	53 34.6	152.51	0.17	9.9932740	22.7	6 48 11.81	
9	344	257 55 5.5	54 35.0	152.54	0.29	9.9932204	21.9	6 44 15.89	
10	345	258 56 6.7	55 36.0	152.56	- 0.39	9.9931687	-21.1	6 40 19.98	
11	346	259 57 8.4	56 37.6	152.58	0.46	9.9931191	20.3	6 36 24.07	
12	347	260 58 10.6	57 39.6	152.60	0.50	9.9930716	19.3	6 32 28.16	
13	348	261 59 13.2	58 42.0	152.62	- 0.51	9.9930265	-18.3	6 28 32.24	
14	349	262 60 16.2	59 44.8	152.64	0.49	9.9929839	17.2	6 24 36.33	
15	350	264 1 19.7	0 48.1	152.66	0.44	9.9929439	16.1	6 20 40.42	
16	351	265 2 23.6	1 51.8	152.67	- 0.36	9.9929065	-15.0	6 16 44.51	
17	352	266 3 28.0	2 56.1	152.69	0.26	9.9928718	13.9	6 12 48.59	
18	353	267 4 32.9	4 0.8	152.71	0.14	9.9928399	12.7	6 8 52.68	
19	354	268 5 38.3	5 6.0	152.73	- 0.01	9.9928108	-11.6	6 4 56.77	
20	355	269 6 44.3	6 11.8	152.76	+ 0.12	9.9927846	10.4	6 1 0.86	
21	356	270 7 50.9	7 18.3	152.78	0.25	9.9927611	9.3	5 57 4.95	
22	357	271 8 58.1	8 25.3	152.81	+ 0.36	9.9927403	- 8.1	5 53 9.04	
23	358	272 10 5.8	9 32.8	152.84	0.47	9.9927221	7.0	5 49 13.13	
24	359	273 11 14.1	10 40.9	152.86	0.55	9.9927064	6.0	5 45 17.22	
25	360	274 12 23.1	11 49.7	152.88	+ 0.61	9.9926932	- 5.0	5 41 21.30	
26	361	275 13 32.6	12 59.0	152.90	0.64	9.9926823	4.1	5 37 25.39	
27	362	276 14 42.5	14 8.8	152.92	0.63	9.9926735	3.2	5 33 29.48	
28	363	277 15 52.9	15 19.1	152.94	+ 0.60	9.9926667	- 2.4	5 29 33.57	
29	364	278 17 3.7	16 29.7	152.96	0.54	9.9926618	1.6	5 25 37.65	
30	365	279 18 14.8	17 40.6	152.97	0.45	9.9926588	0.9	5 21 41.74	
31	366	280 19 26.2	18 51.8	152.97	0.34	9.9926576	- 0.2	5 17 45.83	
32	367	281 20 37.7	20 3.2	152.98	+ 0.22	9.9926581	+ 0.5	5 13 49.92	
NOTE.—The numbers in column $\lambda$ correspond to the true equinox of the date; in column $\lambda'$ , to the mean equinox of January 0 <sup>d</sup> .0.									Diff. for 1 Hour, — 9 <sup>m</sup> .8296. (Table II.)

GREENWICH MEAN TIME									
Day of the Month.	THE MOON'S								
	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
				"	"	"	<sup>h</sup> <sup>m</sup>	<sup>m</sup>	<sup>d</sup>
1	16 38.9	16 42.6	60 59.3	+1.31	61 13.0	+0.95	22 55.9	2.47	27.5
2	16 45.1	16 46.2	61 22.1	+0.55	61 26.2	+0.13	23 56.7	2.59	28.5
3	16 45.9	16 44.2	61 25.1	-0.31	61 18.8	-0.73	δ		0.1
4	16 41.1	16 36.8	61 7.6	-1.13	60 51.8	-1.49	0 59.7	2.67	1.1
5	16 31.4	16 25.1	60 31.9	1.80	60 8.7	2.04	2 2.9	2.60	2.1
6	16 18.1	16 10.5	59 42.9	2.23	59 15.2	2.36	3 4.0	2.47	3.1
7	16 2.7	15 54.7	58 46.3	-2.43	58 16.9	-2.44	4 1.3	2.30	4.1
8	15 46.7	15 39.0	57 47.7	2.41	57 19.2	2.33	4 54.3	2.11	5.1
9	15 31.5	15 24.5	56 51.9	2.21	56 26.1	2.07	5 43.3	1.96	6.1
10	15 18.0	15 12.0	56 2.1	-1.92	55 40.1	-1.75	6 29.0	1.86	7.1
11	15 6.6	15 1.8	55 20.2	1.56	55 2.6	1.37	7 12.5	1.78	8.1
12	14 57.6	14 54.0	54 47.3	1.18	54 34.2	1.00	7 54.8	1.75	9.1
13	14 51.0	14 48.6	54 23.2	-0.83	54 14.4	-0.65	8 36.8	1.77	10.1
14	14 46.8	14 45.5	54 7.6	0.48	54 2.8	0.33	9 19.4	1.80	11.1
15	14 44.6	14 44.3	53 59.7	-0.19	53 58.3	-0.05	10 3.1	1.86	12.1
16	14 44.3	14 44.7	53 58.4	+0.07	54 0.0	+0.19	10 48.5	1.93	13.1
17	14 45.5	14 46.7	54 3.0	0.30	54 7.2	0.40	11 35.7	2.00	14.1
18	14 48.1	14 49.9	54 12.6	0.50	54 19.1	0.59	12 24.4	2.06	15.1
19	14 52.0	14 54.4	54 26.7	+0.68	54 35.4	+0.77	13 14.1	2.08	16.1
20	14 57.0	15 0.0	54 45.2	0.86	54 56.1	0.96	14 4.1	2.08	17.1
21	15 3.3	15 6.9	55 8.2	1.06	55 21.4	1.15	14 53.8	2.05	18.1
22	15 10.8	15 15.1	55 35.8	+1.26	55 51.5	+1.36	15 42.7	2.01	19.1
23	15 19.7	15 24.6	56 8.4	1.46	56 26.5	1.56	16 30.7	1.98	20.1
24	15 29.9	15 35.5	56 45.9	1.66	57 6.4	1.75	17 18.2	1.97	21.1
25	15 41.3	15 47.4	57 27.9	+1.83	57 50.3	+1.89	18 5.8	2.00	22.1
26	15 53.7	16 0.0	58 13.3	1.93	58 36.5	1.94	18 54.4	2.06	23.1
27	16 6.3	16 12.5	58 59.7	1.91	59 22.3	1.84	19 45.1	2.18	24.1
28	16 18.4	16 23.8	59 43.9	+1.73	60 3.8	+1.57	20 38.8	2.31	25.1
29	16 28.6	16 32.6	60 21.5	1.36	60 36.4	1.10	21 36.1	2.47	26.1
30	16 35.8	16 37.8	60 47.9	0.80	60 55.5	+0.46	22 36.9	2.60	27.1
31	16 38.8	16 38.5	60 58.9	+0.10	60 57.9	-0.28	23 39.9	2.65	28.1
32	16 36.9	16 34.2	60 52.2	-0.66	60 42.0	-1.03	δ		29.1



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 1.					MONDAY 3.				
0	14 45 59.05	2.4139	S. 10 58 24.6	12.382	0	16 47 47.13	2.6472	S. 19 8 31.7	7.373
1	14 48 24.04	2.4192	11 10 45.7	12.320	1	16 50 26.07	2.6507	19 15 49.8	7.320
2	14 50 49.35	2.4245	11 23 3.0	12.257	2	16 53 5.21	2.6540	19 22 59.3	7.085
3	14 53 14.98	2.4298	11 35 16.5	12.191	3	16 55 44.55	2.6572	19 30 0.0	6.939
4	14 55 40.93	2.4351	11 47 25.9	12.122	4	16 58 24.08	2.6604	19 36 51.9	6.792
5	14 58 7.19	2.4404	11 59 31.2	12.053	5	17 1 3.80	2.6634	19 43 35.0	6.643
6	15 0 33.77	2.4457	12 11 32.3	11.982	6	17 3 43.69	2.6663	19 50 9.1	6.493
7	15 3 0.67	2.4511	12 23 29.0	11.908	7	17 6 23.75	2.6691	19 56 34.2	6.343
8	15 5 27.90	2.4565	12 35 21.3	11.833	8	17 9 3.98	2.6717	20 2 50.3	6.192
9	15 7 55.45	2.4618	12 47 9.0	11.756	9	17 11 44.36	2.6742	20 8 57.3	6.039
10	15 10 23.31	2.4671	12 58 52.0	11.677	10	17 14 24.89	2.6767	20 14 55.0	5.884
11	15 12 51.50	2.4725	13 10 30.2	11.597	11	17 17 5.57	2.6791	20 20 43.4	5.729
12	15 15 20.01	2.4778	13 22 3.6	11.514	12	17 19 46.38	2.6812	20 26 22.5	5.574
13	15 17 48.84	2.4832	13 33 31.9	11.429	13	17 22 27.31	2.6832	20 31 52.3	5.418
14	15 20 17.99	2.4885	13 44 55.1	11.342	14	17 25 8.36	2.6852	20 37 12.7	5.261
15	15 22 47.46	2.4938	13 56 13.0	11.254	15	17 27 49.53	2.6870	20 42 23.6	5.102
16	15 25 17.25	2.4991	14 7 25.6	11.165	16	17 30 30.80	2.6887	20 47 25.0	4.943
17	15 27 47.36	2.5044	14 18 32.8	11.073	17	17 33 12.17	2.6902	20 52 16.8	4.784
18	15 30 17.78	2.5097	14 29 34.4	10.979	18	17 35 53.62	2.6915	20 56 59.1	4.625
19	15 32 48.52	2.5150	14 40 30.3	10.883	19	17 38 35.15	2.6927	21 1 31.8	4.464
20	15 35 19.58	2.5202	14 51 20.4	10.786	20	17 41 16.75	2.6939	21 5 54.8	4.302
21	15 37 50.95	2.5254	15 2 4.7	10.687	21	17 43 58.42	2.6949	21 10 8.1	4.140
22	15 40 22.63	2.5306	15 12 42.9	10.586	22	17 46 40.14	2.6957	21 14 11.6	3.977
23	15 42 54.62	2.5358	S. 15 23 15.0	10.483	23	17 49 21.91	2.6964	S. 21 18 5.3	3.813
SUNDAY 2.					TUESDAY 4.				
0	15 45 26.93	2.5410	S. 15 33 40.9	10.379	0	17 52 3.71	2.6969	S. 21 21 49.2	3.650
1	15 47 59.54	2.5460	15 44 0.5	10.272	1	17 54 45.54	2.6973	21 25 23.3	3.487
2	15 50 32.45	2.5511	15 54 13.6	10.164	2	17 57 27.39	2.6976	21 28 47.6	3.323
3	15 53 5.67	2.5561	16 4 20.2	10.054	3	18 0 9.26	2.6977	21 32 2.1	3.159
4	15 55 39.19	2.5611	16 14 20.1	9.943	4	18 2 51.12	2.6977	21 35 6.7	2.994
5	15 58 13.00	2.5660	16 24 13.3	9.830	5	18 5 32.98	2.6975	21 38 1.4	2.829
6	16 0 47.11	2.5709	16 33 59.7	9.715	6	18 8 14.82	2.6972	21 40 46.2	2.664
7	16 3 21.51	2.5757	16 43 39.1	9.598	7	18 10 56.64	2.6967	21 43 21.1	2.499
8	16 5 56.19	2.5804	16 53 11.4	9.479	8	18 13 38.42	2.6960	21 45 46.1	2.334
9	16 8 31.16	2.5851	17 2 36.6	9.359	9	18 16 20.16	2.6952	21 48 1.2	2.168
10	16 11 6.41	2.5898	17 11 54.5	9.238	10	18 19 1.85	2.6943	21 50 6.3	2.002
11	16 13 41.94	2.5945	17 21 5.1	9.115	11	18 21 43.48	2.6933	21 52 1.5	1.837
12	16 16 17.75	2.5991	17 30 8.3	8.990	12	18 24 25.05	2.6922	21 53 46.8	1.672
13	16 18 53.83	2.6035	17 39 3.9	8.863	13	18 27 6.54	2.6908	21 55 22.2	1.507
14	16 21 30.17	2.6078	17 47 51.9	8.735	14	18 29 47.94	2.6892	21 56 47.6	1.341
15	16 24 6.77	2.6121	17 56 32.1	8.605	15	18 32 29.24	2.6875	21 58 3.1	1.177
16	16 26 43.63	2.6164	18 5 4.5	8.474	16	18 35 10.44	2.6857	21 59 8.8	1.012
17	16 29 20.74	2.6205	18 13 29.0	8.342	17	18 37 51.53	2.6837	22 0 4.6	0.847
18	16 31 58.09	2.6245	18 21 45.5	8.208	18	18 40 32.49	2.6816	22 0 50.5	0.683
19	16 34 35.68	2.6285	18 29 53.9	8.072	19	18 43 13.32	2.6794	22 1 26.6	0.519
20	16 37 13.51	2.6325	18 37 54.1	7.935	20	18 45 54.02	2.6771	22 1 52.9	0.357
21	16 39 51.58	2.6364	18 45 46.1	7.797	21	18 48 34.57	2.6746	22 2 9.4	0.194
22	16 42 29.68	2.6402	18 53 29.8	7.657	22	18 51 14.97	2.6719	22 2 16.1	- 0.031
23	16 45 8.40	2.6437	19 1 5.0	7.516	23	18 53 55.20	2.6691	22 2 13.1	+ 0.131
24	16 47 47.13	2.6472	S. 19 8 31.7	7.373	24	18 56 35.26	2.6662	S. 22 2 0.4	0.292

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
WEDNESDAY 5.					FRIDAY 7.				
0	18 56 35.26	2.6662	S. 22° 2' 0.4	0.999	0	20 50 4.59	2.4067	S. 18° 50' 3.0	6.880
1	18 59 15.14	2.6631	22 1 38.0	0.453	1	21 1 28.78	2.3999	18 52 7.0	6.987
2	19 1 54.83	2.6599	22 1 6.0	0.613	2	21 3 52.57	2.3931	18 45 4.6	7.092
3	19 4 34.33	2.6566	22 0 24.4	0.773	3	21 6 15.95	2.3862	18 37 56.0	7.194
4	19 7 13.62	2.6531	21 59 33.2	0.939	4	21 8 32.92	2.3793	18 30 41.3	7.295
5	19 9 52.70	2.6495	21 58 32.5	1.091	5	21 11 1.47	2.3724	18 23 20.6	7.395
6	19 12 31.56	2.6457	21 57 22.3	1.248	6	21 13 23.61	2.3656	18 15 53.9	7.494
7	19 15 10.19	2.6419	21 56 2.7	1.405	7	21 15 45.34	2.3587	18 8 21.3	7.592
8	19 17 48.59	2.6390	21 54 33.7	1.561	8	21 18 6.66	2.3519	18 0 42.9	7.687
9	19 20 26.75	2.6339	21 52 55.4	1.716	9	21 20 27.57	2.3451	17 52 58.9	7.780
10	19 23 4.66	2.6297	21 51 7.8	1.871	10	21 22 48.07	2.3382	17 45 9.3	7.873
11	19 25 42.32	2.6254	21 49 10.9	2.024	11	21 25 8.15	2.3313	17 37 14.1	7.966
12	19 28 19.71	2.6209	21 47 4.9	2.176	12	21 27 27.82	2.3244	17 29 13.4	8.058
13	19 30 56.83	2.6164	21 44 49.8	2.327	13	21 29 47.08	2.3176	17 21 7.4	8.144
14	19 33 33.68	2.6117	21 42 25.6	2.478	14	21 32 5.93	2.3108	17 12 56.1	8.232
15	19 36 10.24	2.6069	21 39 52.4	2.628	15	21 34 24.38	2.3041	17 4 39.6	8.318
16	19 38 46.51	2.6021	21 37 10.2	2.777	16	21 36 42.42	2.2973	16 56 18.0	8.402
17	19 41 22.49	2.5972	21 34 19.1	2.925	17	21 39 0.05	2.2904	16 47 51.4	8.485
18	19 43 58.17	2.5921	21 31 19.2	3.072	18	21 41 17.27	2.2837	16 39 19.8	8.567
19	19 46 33.54	2.5869	21 28 10.5	3.217	19	21 43 34.09	2.2770	16 30 43.1	8.647
20	19 49 8.60	2.5816	21 24 53.2	3.360	20	21 45 50.51	2.2702	16 22 2.2	8.727
21	19 51 43.33	2.5761	21 21 27.3	3.503	21	21 48 6.52	2.2635	16 13 16.2	8.805
22	19 54 17.73	2.5707	21 17 52.9	3.645	22	21 50 22.13	2.2569	16 4 25.6	8.881
23	19 56 51.81	2.5652	S. 21 14 9.9	3.787	23	21 52 37.35	2.2504	S. 15 55 30.5	8.956
THURSDAY 6.					SATURDAY 8.				
0	19 59 25.56	2.5597	S. 21 10 18.5	3.926	0	21 54 52.18	2.2438	S. 15 46 30.9	9.030
1	20 1 58.97	2.5539	21 6 18.8	4.064	1	21 57 6.61	2.2372	15 37 26.9	9.102
2	20 4 32.03	2.5481	21 2 10.8	4.203	2	21 59 20.65	2.2307	15 28 18.6	9.172
3	20 7 4.74	2.5422	20 57 54.6	4.338	3	22 1 34.30	2.2242	15 19 6.2	9.242
4	20 9 37.09	2.5363	20 53 30.3	4.472	4	22 3 47.56	2.2177	15 9 49.6	9.311
5	20 12 9.00	2.5303	20 48 58.0	4.605	5	22 6 0.43	2.2112	15 0 28.9	9.378
6	20 14 40.73	2.5242	20 44 17.7	4.737	6	22 8 12.91	2.2049	14 51 4.2	9.444
7	20 17 12.00	2.5181	20 39 29.5	4.868	7	22 10 25.01	2.1986	14 41 35.6	9.509
8	20 19 42.90	2.5119	20 34 33.5	4.998	8	22 12 36.74	2.1924	14 32 3.1	9.572
9	20 22 13.43	2.5057	20 29 29.8	5.126	9	22 14 48.10	2.1861	14 22 26.9	9.634
10	20 24 43.58	2.4993	20 24 18.4	5.253	10	22 16 59.08	2.1798	14 12 47.0	9.695
11	20 27 13.35	2.4930	20 18 59.5	5.378	11	22 19 9.68	2.1736	14 3 3.5	9.755
12	20 29 42.74	2.4866	20 13 33.1	5.502	12	22 21 19.91	2.1675	13 53 16.4	9.814
13	20 32 11.74	2.4801	20 7 59.3	5.624	13	22 23 29.78	2.1615	13 43 25.8	9.872
14	20 34 40.35	2.4736	20 2 18.2	5.746	14	22 25 39.29	2.1555	13 33 31.8	9.927
15	20 37 8.57	2.4671	19 56 29.8	5.866	15	22 27 48.44	2.1496	13 23 31.6	9.981
16	20 39 36.40	2.4605	19 50 34.3	5.984	16	22 29 57.24	2.1437	13 13 34.1	10.035
17	20 42 3.83	2.4538	19 44 31.7	6.101	17	22 32 5.68	2.1378	13 3 30.4	10.087
18	20 44 30.86	2.4472	19 38 22.2	6.216	18	22 34 13.77	2.1319	12 53 23.6	10.139
19	20 46 57.49	2.4405	19 32 5.8	6.331	19	22 36 21.51	2.1262	12 43 13.7	10.189
20	20 49 23.72	2.4338	19 25 42.5	6.444	20	22 38 28.91	2.1205	12 33 0.9	10.238
21	20 51 49.55	2.4271	19 19 12.5	6.556	21	22 40 35.97	2.1148	12 22 45.2	10.286
22	20 54 14.97	2.4203	19 12 35.8	6.666	22	22 42 42.69	2.1092	12 12 26.6	10.333
23	20 56 39.98	2.4135	19 5 52.6	6.773	23	22 44 49.08	2.1036	12 2 5.2	10.379
24	20 59 4.59	2.4067	S. 18 59 3.0	6.880	24	22 46 55.13	2.0981	S. 11 51 41.1	10.423

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SUNDAY 9.					TUESDAY 11.				
0	<sup>h</sup> 22 <sup>m</sup> 46 <sup>s</sup> 55.13	2.0981	<sup>s</sup> 11° 51' 41.1"	10.493	0	<sup>h</sup> 0 22 <sup>m</sup> 29.53	1.9089	<sup>s</sup> 2° 58' 29.7"	11.459
1	22 49 0.85	2.0927	11 41 14.4	10.467	1	0 24 23.99	1.9066	2 47 2.1	11.460
2	22 51 6.25	2.0874	11 30 45.1	10.510	2	0 26 18.32	1.9043	2 35 34.5	11.461
3	22 53 11.34	2.0822	11 20 13.2	10.552	3	0 28 12.51	1.9021	2 24 6.8	11.462
4	22 55 16.11	2.0769	11 9 33.9	10.592	4	0 30 6.57	1.8999	2 12 39.1	11.462
5	22 57 20.57	2.0717	10 59 2.2	10.631	5	0 32 0.50	1.8978	2 1 11.4	11.461
6	22 59 24.71	2.0665	10 48 23.2	10.669	6	0 33 54.31	1.8958	1 49 43.8	11.459
7	23 1 28.55	2.0615	10 37 42.0	10.705	7	0 35 48.00	1.8938	1 38 16.4	11.456
8	23 3 32.09	2.0565	10 26 58.5	10.742	8	0 37 41.57	1.8919	1 26 49.1	11.453
9	23 5 35.33	2.0515	10 16 12.9	10.777	9	0 39 35.03	1.8901	1 15 22.0	11.449
10	23 7 38.27	2.0466	10 5 25.2	10.812	10	0 41 28.38	1.8883	1 3 55.2	11.445
11	23 9 40.92	2.0417	9 54 35.5	10.845	11	0 43 21.63	1.8866	0 52 28.6	11.441
12	23 11 43.28	2.0370	9 43 43.8	10.878	12	0 45 14.78	1.8850	0 41 2.3	11.435
13	23 13 45.36	2.0323	9 32 50.1	10.910	13	0 47 7.83	1.8834	0 29 36.4	11.428
14	23 15 47.16	2.0277	9 21 54.6	10.939	14	0 49 0.79	1.8819	0 18 10.9	11.421
15	23 17 48.68	2.0231	9 10 57.4	10.968	15	0 50 53.66	1.8805	0 6 45.9	11.414
16	23 19 49.93	2.0186	8 59 58.5	10.996	16	0 52 46.45	1.8791	N. 0 4 38.7	11.406
17	23 21 50.91	2.0142	8 48 57.9	11.023	17	0 54 39.15	1.8777	0 16 2.8	11.397
18	23 23 51.63	2.0098	8 37 55.7	11.050	18	0 56 31.77	1.8764	0 27 26.3	11.387
19	23 25 52.09	2.0055	8 26 51.9	11.076	19	0 58 24.32	1.8752	0 38 49.2	11.377
20	23 27 52.29	2.0012	8 15 46.6	11.101	20	1 0 16.80	1.8741	0 50 11.5	11.367
21	23 29 52.23	1.9969	8 4 39.8	11.125	21	1 2 9.21	1.8729	1 1 33.2	11.355
22	23 31 51.92	1.9928	7 53 31.6	11.148	22	1 4 1.55	1.8719	1 12 54.1	11.342
23	23 33 51.37	1.9889	S. 7 42 22.0	11.170	23	1 5 53.84	1.8710	N. 1 24 14.3	11.330
MONDAY 10.					WEDNESDAY 12.				
0	23 35 50.59	1.9850	S. 7 31 11.2	11.191	0	1 7 46.07	1.8701	N. 1 35 33.7	11.317
1	23 37 49.57	1.9810	7 19 59.1	11.212	1	1 9 38.25	1.8692	1 46 52.3	11.302
2	23 39 48.31	1.9771	7 8 45.8	11.231	2	1 11 30.38	1.8684	1 58 10.0	11.287
3	23 41 46.82	1.9732	6 57 31.4	11.249	3	1 13 22.46	1.8677	2 9 26.8	11.272
4	23 43 45.10	1.9695	6 46 15.9	11.267	4	1 15 14.50	1.8670	2 20 42.7	11.257
5	23 45 43.16	1.9659	6 34 59.4	11.284	5	1 17 6.50	1.8664	2 31 57.6	11.241
6	23 47 41.01	1.9624	6 23 41.8	11.301	6	1 18 58.47	1.8659	2 43 11.6	11.224
7	23 49 38.65	1.9588	6 12 23.2	11.317	7	1 20 50.41	1.8654	2 54 24.5	11.206
8	23 51 36.07	1.9553	6 1 3.8	11.330	8	1 22 42.32	1.8649	3 5 36.3	11.187
9	23 53 33.28	1.9519	5 49 43.6	11.343	9	1 24 34.20	1.8645	3 16 47.0	11.168
10	23 55 30.29	1.9486	5 38 22.6	11.356	10	1 26 26.06	1.8642	3 27 56.5	11.149
11	23 57 27.11	1.9453	5 27 0.8	11.369	11	1 28 17.91	1.8640	3 39 4.9	11.130
12	23 59 23.73	1.9421	5 15 38.3	11.381	12	1 30 9.74	1.8638	3 50 12.1	11.109
13	0 1 20.16	1.9390	5 4 15.1	11.392	13	1 32 1.56	1.8636	4 1 18.0	11.087
14	0 3 16.41	1.9360	4 52 51.3	11.401	14	1 33 53.37	1.8635	4 12 22.6	11.065
15	0 5 12.48	1.9330	4 41 27.0	11.410	15	1 35 45.18	1.8635	4 23 25.8	11.042
16	0 7 8.37	1.9300	4 30 2.1	11.418	16	1 37 36.99	1.8635	4 34 27.7	11.020
17	0 9 4.08	1.9271	4 18 36.8	11.426	17	1 39 28.80	1.8635	4 45 28.2	10.997
18	0 10 59.62	1.9243	4 7 11.0	11.433	18	1 41 20.61	1.8636	4 56 27.3	10.972
19	0 12 55.00	1.9216	3 55 44.8	11.439	19	1 43 12.43	1.8638	5 7 24.9	10.947
20	0 14 50.22	1.9190	3 44 18.3	11.444	20	1 45 4.27	1.8641	5 18 21.0	10.922
21	0 16 45.28	1.9163	3 32 51.5	11.448	21	1 46 56.12	1.8644	5 29 15.5	10.896
22	0 18 40.18	1.9137	3 21 24.5	11.452	22	1 48 47.99	1.8647	5 40 8.5	10.869
23	0 20 31.93	1.9112	3 9 57.2	11.456	23	1 50 39.88	1.8650	5 50 59.8	10.842
24	0 22 29.53	1.9089	S. 2 58 29.7	11.459	24	1 52 31.79	1.8654	N. 6 1 49.5	10.814

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
THURSDAY 13.					SATURDAY 15.				
0	1 <sup>h</sup> 52 <sup>m</sup> 31.79	1.8654	N. 6° 1' 49.5"	10.814	0	3 <sup>h</sup> 23 <sup>m</sup> 27.70	1.9389	N. 13° 57' 20.7"	8.763
1	1 54 23.73	1.8659	6 12 37.5	10.786	1	3 25 24.10	1.9412	14 6 4.8	8.705
2	1 56 15.70	1.8665	6 23 23.8	10.757	2	3 27 20.65	1.9437	14 14 45.3	8.646
3	1 58 7.71	1.8671	6 34 8.3	10.727	3	3 29 17.35	1.9462	14 23 22.3	8.587
4	1 59 59.75	1.8678	6 44 51.0	10.697	4	3 31 14.20	1.9487	14 31 55.7	8.527
5	2 1 51.84	1.8685	6 55 31.9	10.667	5	3 33 11.19	1.9511	14 40 25.5	8.467
6	2 3 43.97	1.8692	7 6 11.0	10.636	6	3 35 8.33	1.9536	14 48 51.7	8.406
7	2 5 36.14	1.8699	7 16 48.2	10.603	7	3 37 5.63	1.9562	14 57 14.2	8.344
8	2 7 28.36	1.8708	7 27 23.4	10.570	8	3 39 3.08	1.9588	15 5 32.9	8.281
9	2 9 20.64	1.8717	7 37 56.6	10.537	9	3 41 0.69	1.9614	15 13 47.9	8.218
10	2 11 12.97	1.8727	7 48 27.8	10.502	10	3 42 58.45	1.9640	15 21 59.1	8.154
11	2 13 5.36	1.8737	7 58 56.9	10.467	11	3 44 56.37	1.9667	15 30 6.4	8.090
12	2 14 57.81	1.8747	8 9 23.9	10.432	12	3 46 54.45	1.9693	15 38 9.9	8.026
13	2 16 50.32	1.8757	8 19 48.8	10.397	13	3 48 52.69	1.9720	15 46 9.5	7.960
14	2 18 42.90	1.8768	8 30 11.6	10.362	14	3 50 51.09	1.9746	15 54 5.1	7.893
15	2 20 35.54	1.8780	8 40 32.2	10.325	15	3 52 49.64	1.9773	16 1 56.7	7.826
16	2 22 28.26	1.8792	8 50 50.6	10.287	16	3 54 48.36	1.9800	16 9 44.2	7.759
17	2 24 21.05	1.8805	9 1 6.7	10.249	17	3 56 47.24	1.9827	16 17 27.7	7.691
18	2 26 13.92	1.8818	9 11 20.5	10.211	18	3 58 46.29	1.9855	16 25 7.1	7.622
19	2 28 6.87	1.8832	9 21 32.0	10.172	19	4 0 45.50	1.9882	16 32 42.3	7.552
20	2 29 59.90	1.8845	9 31 41.1	10.132	20	4 2 44.88	1.9910	16 40 13.3	7.482
21	2 31 53.01	1.8859	9 41 47.8	10.091	21	4 4 44.42	1.9938	16 47 40.1	7.412
22	2 33 46.21	1.8874	9 51 52.0	10.049	22	4 6 44.13	1.9966	16 55 2.7	7.340
23	2 35 39.50	1.8889	N. 10° 1' 53.7"	10.008	23	4 8 44.01	1.9994	N. 17° 2' 20.9"	7.267
FRIDAY 14.					SUNDAY 16.				
0	2 37 32.88	1.8905	N. 10° 11' 52.9"	9.966	0	4 10 44.06	2.0022	N. 17° 9' 34.8"	7.195
1	2 39 26.36	1.8922	10 21 49.6	9.923	1	4 12 44.28	2.0050	17 16 44.3	7.122
2	2 41 19.94	1.8938	10 31 43.7	9.879	2	4 14 44.66	2.0078	17 23 49.4	7.048
3	2 43 13.61	1.8954	10 41 35.1	9.834	3	4 16 45.21	2.0106	17 30 50.1	6.973
4	2 45 7.39	1.8972	10 51 23.8	9.789	4	4 18 45.93	2.0134	17 37 46.2	6.898
5	2 47 1.27	1.8989	11 1 9.8	9.744	5	4 20 46.82	2.0162	17 44 37.8	6.823
6	2 48 55.26	1.9007	11 10 53.1	9.693	6	4 22 47.88	2.0191	17 51 24.9	6.747
7	2 50 49.36	1.9026	11 20 33.7	9.652	7	4 24 49.11	2.0219	17 58 7.4	6.669
8	2 52 43.57	1.9044	11 30 11.4	9.604	8	4 26 50.51	2.0247	18 4 45.2	6.591
9	2 54 37.89	1.9063	11 39 46.2	9.556	9	4 28 52.08	2.0276	18 11 18.3	6.512
10	2 56 32.33	1.9082	11 49 18.1	9.507	10	4 30 53.82	2.0304	18 17 46.7	6.433
11	2 58 26.88	1.9102	11 58 47.1	9.459	11	4 32 55.73	2.0332	18 24 10.3	6.354
12	3 0 21.55	1.9122	12 8 13.2	9.410	12	4 34 57.81	2.0361	18 30 29.2	6.275
13	3 2 16.35	1.9143	12 17 36.3	9.359	13	4 37 0.06	2.0389	18 36 47.3	6.194
14	3 4 11.27	1.9164	12 26 56.3	9.308	14	4 39 2.48	2.0418	18 42 52.5	6.112
15	3 6 6.32	1.9185	12 36 13.2	9.256	15	4 41 5.07	2.0446	18 48 56.7	6.029
16	3 8 1.49	1.9206	12 45 27.0	9.203	16	4 43 7.83	2.0473	18 54 56.0	5.947
17	3 9 56.79	1.9228	12 54 37.6	9.151	17	4 45 10.75	2.0501	19 0 50.4	5.865
18	3 11 52.23	1.9251	13 3 45.1	9.098	18	4 47 13.84	2.0529	19 6 39.8	5.781
19	3 13 47.80	1.9273	13 12 49.4	9.044	19	4 49 17.10	2.0557	19 12 24.1	5.696
20	3 15 43.50	1.9295	13 21 50.4	8.989	20	4 51 20.52	2.0584	19 18 3.3	5.611
21	3 17 39.34	1.9318	13 30 48.0	8.933	21	4 53 24.11	2.0612	19 23 37.4	5.526
22	3 19 35.32	1.9342	13 39 42.3	8.877	22	4 55 27.87	2.0640	19 29 6.4	5.441
23	3 21 31.44	1.9365	13 48 33.2	8.820	23	4 57 31.79	2.0667	19 34 30.3	5.355
24	3 23 27.70	1.9388	N. 13° 57' 20.7"	8.763	24	4 59 35.87	2.0694	N. 19° 39' 49.0"	5.267

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
MONDAY 17.					WEDNESDAY 19.				
0	4 59 35.87	2.0694	N.19° 39' 49.0"	5.267	0	6 41 35.54	2.1673	N.22° 2' 48.2"	0.537
1	5 1 40.11	2.0721	19 45 2.4	5.179	1	6 43 45.61	2.1683	22 3 17.2	0.430
2	5 3 44.52	2.0748	19 50 10.5	5.090	2	6 45 55.74	2.1693	22 3 39.8	0.323
3	5 5 49.09	2.0775	19 55 13.2	5.001	3	6 48 5.93	2.1703	22 3 56.0	0.216
4	5 7 53.82	2.0802	20 0 10.6	4.912	4	6 50 16.18	2.1713	22 4 5.7	0.109
5	5 9 58.71	2.0828	20 5 2.6	4.822	5	6 52 26.48	2.1722	22 4 9.0	+ 0.002
6	5 12 3.75	2.0854	20 9 49.3	4.732	6	6 54 36.84	2.1731	22 4 5.9	- 0.106
7	5 14 8.95	2.0880	20 14 30.5	4.641	7	6 56 47.25	2.1738	22 3 56.3	0.213
8	5 16 14.31	2.0906	20 19 6.2	4.549	8	6 58 57.70	2.1745	22 3 40.3	0.321
9	5 18 19.82	2.0931	20 23 36.4	4.457	9	7 1 8.19	2.1752	22 3 17.8	0.429
10	5 20 25.48	2.0956	20 28 1.0	4.364	10	7 3 18.72	2.1758	22 2 48.8	0.537
11	5 22 31.29	2.0982	20 32 20.1	4.271	11	7 5 29.29	2.1765	22 2 13.4	0.644
12	5 24 37.26	2.1007	20 36 33.6	4.178	12	7 7 39.90	2.1771	22 1 31.5	0.753
13	5 26 43.37	2.1031	20 40 41.5	4.084	13	7 9 50.54	2.1776	22 0 43.1	0.861
14	5 28 49.63	2.1056	20 44 43.7	3.989	14	7 12 1.21	2.1780	21 59 48.2	0.968
15	5 30 56.04	2.1080	20 48 40.2	3.894	15	7 14 11.90	2.1784	21 58 46.9	1.076
16	5 33 2.59	2.1103	20 52 31.0	3.798	16	7 16 22.62	2.1788	21 57 39.1	1.184
17	5 35 9.28	2.1126	20 56 16.0	3.702	17	7 18 33.36	2.1791	21 56 24.8	1.292
18	5 37 16.10	2.1149	20 59 55.3	3.606	18	7 20 44.11	2.1794	21 55 4.0	1.401
19	5 39 23.06	2.1172	21 3 28.8	3.509	19	7 22 54.88	2.1796	21 53 36.7	1.509
20	5 41 30.16	2.1195	21 6 56.4	3.412	20	7 25 5.66	2.1798	21 52 2.9	1.617
21	5 43 37.40	2.1217	21 10 18.2	3.314	21	7 27 16.45	2.1799	21 50 22.7	1.724
22	5 45 44.77	2.1239	21 13 34.1	3.216	22	7 29 27.25	2.1800	21 48 36.0	1.832
23	5 47 52.27	2.1261	N.21° 16' 44.1"	3.117	23	7 31 38.05	2.1800	N.21° 46' 42.8"	1.941
TUESDAY 18.					THURSDAY 20.				
0	5 49 59.90	2.1282	N.21° 19' 48.1"	3.017	0	7 33 48.85	2.1800	N.21° 44' 43.1"	2.048
1	5 52 7.66	2.1303	21 22 46.2	2.918	1	7 35 59.65	2.1799	21 42 37.0	2.156
2	5 54 15.54	2.1323	21 25 38.3	2.818	2	7 38 10.44	2.1798	21 40 24.4	2.264
3	5 56 23.54	2.1343	21 28 24.1	2.718	3	7 40 21.23	2.1797	21 38 5.3	2.372
4	5 58 31.66	2.1363	21 31 4.5	2.617	4	7 42 32.01	2.1796	21 35 39.8	2.479
5	6 0 39.90	2.1382	21 33 38.5	2.517	5	7 44 42.78	2.1793	21 33 7.8	2.586
6	6 2 48.25	2.1402	21 36 6.5	2.416	6	7 46 53.53	2.1790	21 30 29.4	2.693
7	6 4 56.72	2.1421	21 38 28.4	2.314	7	7 49 4.26	2.1787	21 27 44.6	2.800
8	6 6 7 5.30	2.1438	21 40 41.1	2.211	8	7 51 14.97	2.1783	21 24 53.4	2.908
9	6 9 13.98	2.1456	21 42 53.7	2.108	9	7 53 25.66	2.1780	21 21 55.7	3.015
10	6 11 22.77	2.1473	21 44 57.1	2.005	10	7 55 36.3	2.1776	21 18 51.6	3.121
11	6 13 31.66	2.1491	21 46 54.3	1.903	11	7 57 46.97	2.1770	21 15 41.2	3.227
12	6 15 40.66	2.1508	21 48 45.4	1.800	12	7 59 57.57	2.1764	21 12 24.4	3.333
13	6 17 49.76	2.1524	21 50 30.3	1.696	13	8 2 8.14	2.1759	21 9 1.2	3.439
14	6 19 58.95	2.1539	21 52 8.9	1.591	14	8 4 18.68	2.1754	21 5 31.7	3.545
15	6 22 8.23	2.1554	21 53 41.2	1.486	15	8 6 29.19	2.1748	21 1 55.8	3.651
16	6 24 17.60	2.1569	21 55 7.2	1.382	16	8 8 39.66	2.1741	20 58 13.6	3.756
17	6 26 27.06	2.1584	21 56 27.0	1.277	17	8 10 50.08	2.1733	20 54 25.1	3.861
18	6 28 36.61	2.1598	21 57 40.5	1.172	18	8 13 0.46	2.1726	20 50 30.3	3.966
19	6 30 46.24	2.1611	21 58 47.6	1.068	19	8 15 10.79	2.1718	20 46 29.2	4.070
20	6 32 55.95	2.1624	21 59 48.4	0.961	20	8 17 21.08	2.1711	20 42 21.9	4.174
21	6 35 5.73	2.1637	22 0 42.9	0.855	21	8 19 31.32	2.1702	20 38 8.3	4.278
22	6 37 15.59	2.1650	22 1 31.0	0.749	22	8 21 41.51	2.1693	20 33 48.5	4.382
23	6 39 25.53	2.1662	22 2 12.8	0.643	23	8 23 51.64	2.1683	20 29 22.4	4.486
24	6 41 35.54	2.1673	N.22° 2' 48.2"	0.537	24	8 26 1.71	2.1673	N.20° 24' 50.1"	4.589

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
FRIDAY 21.					SUNDAY 23.				
0	8 26 1.71	2.1573	N.20° 24' 50.1	4.580	0	10 8 37.30	2.1046	N.14° 53' 44.4	9.015
1	8 28 11.72	2.1604	20 20 11.7	4.609	1	10 10 43.54	2.1033	14 44 41.1	9.003
2	8 30 21.68	2.1655	20 15 27.1	4.704	2	10 12 49.70	2.1081	14 35 33.2	9.171
3	8 32 31.58	2.1645	20 10 36.4	4.896	3	10 14 55.79	2.1009	14 26 20.6	9.948
4	8 34 41.42	2.1634	20 5 39.6	4.997	4	10 17 1.81	2.0997	14 17 3.4	9.395
5	8 36 51.19	2.1623	20 0 36.7	5.099	5	10 19 7.75	2.0984	14 7 41.6	9.409
6	8 39 0.90	2.1613	19 55 27.7	5.200	6	10 21 13.62	2.0973	13 58 15.2	9.477
7	8 41 10.54	2.1601	19 50 12.7	5.300	7	10 23 19.42	2.0963	13 48 44.3	9.552
8	8 43 20.11	2.1590	19 44 51.7	5.401	8	10 25 25.16	2.0951	13 39 9.0	9.696
9	8 45 29.62	2.1578	19 39 24.6	5.501	9	10 27 30.83	2.0939	13 29 20.2	9.700
10	8 47 39.05	2.1566	19 33 51.6	5.600	10	10 29 36.43	2.0928	13 19 45.0	9.779
11	8 49 48.41	2.1553	19 28 12.6	5.699	11	10 31 41.97	2.0918	13 9 56.5	9.844
12	8 51 57.69	2.1541	19 22 27.7	5.798	12	10 33 47.45	2.0906	13 0 3.7	9.916
13	8 54 6.90	2.1528	19 16 36.9	5.896	13	10 35 52.87	2.0896	12 50 6.6	9.987
14	8 56 16.03	2.1515	19 10 40.2	5.993	14	10 37 58.23	2.0889	12 40 5.3	10.067
15	8 58 25.08	2.1503	19 4 37.7	6.091	15	10 40 3.54	2.0880	12 29 59.8	10.196
16	9 0 34.06	2.1490	18 58 29.3	6.188	16	10 42 8.79	2.0871	12 19 50.2	10.194
17	9 2 42.96	2.1477	18 52 15.1	6.284	17	10 44 13.99	2.0863	12 9 36.5	10.269
18	9 4 51.78	2.1463	18 45 55.2	6.380	18	10 46 19.13	2.0854	11 59 18.7	10.330
19	9 7 0.52	2.1450	18 39 29.5	6.476	19	10 48 24.23	2.0846	11 48 56.9	10.397
20	9 9 9.18	2.1436	18 32 58.1	6.571	20	10 50 29.28	2.0838	11 38 31.1	10.462
21	9 11 17.75	2.1422	18 26 21.0	6.665	21	10 52 34.28	2.0830	11 28 1.4	10.537
22	9 13 26.24	2.1408	18 19 38.3	6.759	22	10 54 39.24	2.0823	11 17 27.8	10.599
23	9 15 34.65	2.1394	N.18 12 49.9	6.853	23	10 56 44.16	2.0817	N.11 6 50.4	10.656
SATURDAY 22.					MONDAY 24.				
0	9 17 42.97	2.1380	N.18 5 55.9	6.947	0	10 58 49.05	2.0812	N.10 56 9.1	10.719
1	9 19 51.21	2.1366	17 58 56.3	7.039	1	11 0 53.90	2.0806	10 45 24.1	10.781
2	9 21 59.36	2.1352	17 51 51.2	7.131	2	11 2 58.72	2.0800	10 34 35.4	10.849
3	9 24 7.43	2.1338	17 44 40.6	7.223	3	11 5 3.50	2.0795	10 23 43.0	10.903
4	9 26 15.42	2.1324	17 37 24.5	7.313	4	11 7 8.26	2.0791	10 12 47.0	10.963
5	9 28 23.32	2.1309	17 30 3.0	7.403	5	11 9 12.99	2.0787	10 1 47.5	11.022
6	9 30 31.13	2.1295	17 22 36.1	7.493	6	11 11 17.70	2.0783	9 50 44.4	11.081
7	9 32 38.86	2.1281	17 15 3.8	7.583	7	11 13 22.38	2.0779	9 39 37.8	11.138
8	9 34 46.50	2.1266	17 7 26.2	7.673	8	11 15 27.05	2.0777	9 28 27.8	11.195
9	9 36 54.05	2.1252	16 59 43.2	7.761	9	11 17 31.70	2.0774	9 17 14.4	11.252
10	9 39 1.52	2.1237	16 51 54.9	7.848	10	11 19 36.34	2.0773	9 5 57.6	11.307
11	9 41 8.90	2.1223	16 44 1.4	7.935	11	11 21 40.97	2.0771	8 54 37.5	11.369
12	9 43 16.20	2.1209	16 36 2.7	8.023	12	11 23 45.59	2.0770	8 43 14.2	11.415
13	9 45 23.41	2.1195	16 27 58.8	8.108	13	11 25 50.21	2.0770	8 31 47.7	11.468
14	9 47 30.54	2.1181	16 19 49.8	8.193	14	11 27 54.83	2.0769	8 20 18.0	11.521
15	9 49 37.59	2.1167	16 11 35.7	8.278	15	11 29 59.44	2.0769	8 8 45.2	11.579
16	9 51 44.55	2.1153	16 3 16.5	8.363	16	11 32 4.06	2.0771	7 57 9.4	11.633
17	9 53 51.43	2.1139	15 54 52.2	8.447	17	11 34 8.69	2.0773	7 45 30.5	11.673
18	9 55 58.22	2.1126	15 46 22.9	8.539	18	11 36 13.33	2.0774	7 33 48.6	11.722
19	9 58 4.94	2.1112	15 37 48.7	8.611	19	11 38 17.98	2.0776	7 22 3.8	11.770
20	10 0 11.57	2.1098	15 29 9.6	8.693	20	11 40 22.64	2.0778	7 10 16.2	11.817
21	10 2 18.12	2.1085	15 20 25.5	8.775	21	11 42 27.32	2.0789	6 58 25.8	11.863
22	10 4 24.59	2.1073	15 11 36.6	8.855	22	11 44 32.03	2.0787	6 46 32.6	11.909
23	10 6 30.98	2.1059	15 2 42.9	8.935	23	11 46 36.76	2.0791	6 34 36.7	11.955
24	10 8 37.30	2.1046	N.14 53 44.4	9.015	24	11 48 41.52	2.0796	N. 6 22 38.0	12.000

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
TUESDAY 25.					THURSDAY 27.				
0	11 48 41.52	2.0796	N. 6° 22' 38.0"	12.000	0	13 30 13.34	2.1750	S. 3° 46' 27.8"	12.987
1	11 50 46.31	2.0802	6 10 36.7	12.042	1	13 32 23.95	2.1768	3 59 26.8	12.980
2	11 52 51.14	2.0808	5 58 32.9	12.084	2	13 34 34.77	2.1822	4 12 25.4	12.972
3	11 54 56.01	2.0815	5 46 26.6	12.126	3	13 36 45.81	2.1850	4 25 23.5	12.963
4	11 57 0.92	2.0822	5 34 17.8	12.167	4	13 38 57.08	2.1866	4 38 21.0	12.953
5	11 59 5.87	2.0829	5 22 6.6	12.208	5	13 41 8.57	2.1934	4 51 17.9	12.942
6	12 1 10.87	2.0837	5 9 53.1	12.245	6	13 43 20.29	2.1973	5 4 14.1	12.930
7	12 3 15.92	2.0847	4 57 37.2	12.284	7	13 45 32.25	2.2013	5 17 9.5	12.916
8	12 5 21.03	2.0857	4 45 19.0	12.321	8	13 47 44.45	2.2053	5 30 4.0	12.900
9	12 7 26.20	2.0867	4 32 58.7	12.356	9	13 49 56.80	2.2093	5 42 57.5	12.883
10	12 9 31.43	2.0877	4 20 36.3	12.392	10	13 52 9.57	2.2134	5 55 50.0	12.865
11	12 11 36.73	2.0888	4 8 11.7	12.427	11	13 54 22.50	2.2176	6 8 41.3	12.845
12	12 13 42.09	2.0900	3 55 45.1	12.460	12	13 56 35.69	2.2219	6 21 31.4	12.824
13	12 15 47.53	2.0913	3 43 16.5	12.492	13	13 58 49.13	2.2262	6 34 20.2	12.802
14	12 17 53.05	2.0926	3 30 46.0	12.524	14	14 1 2.83	2.2306	6 47 7.7	12.779
15	12 19 58.64	2.0939	3 18 13.6	12.555	15	14 3 16.80	2.2350	6 59 53.7	12.754
16	12 22 4.32	2.0954	3 5 30.4	12.585	16	14 5 31.03	2.2395	7 12 38.2	12.728
17	12 24 10.09	2.0969	2 53 3.4	12.613	17	14 7 45.54	2.2441	7 25 21.1	12.700
18	12 26 15.95	2.0984	2 40 25.8	12.640	18	14 10 0.32	2.2486	7 38 2.2	12.670
19	12 28 21.90	2.1000	2 27 46.6	12.667	19	14 12 15.37	2.2532	7 50 41.5	12.640
20	12 30 27.95	2.1016	2 15 5.8	12.693	20	14 14 30.70	2.2579	8 3 19.0	12.608
21	12 32 34.11	2.1036	2 2 23.4	12.719	21	14 16 46.32	2.2627	8 15 54.5	12.574
22	12 34 40.38	2.1054	1 49 39.5	12.743	22	14 19 2.23	2.2676	8 28 27.9	12.539
23	12 36 46.76	2.1073	N. 1° 36' 54.2"	12.766	23	14 21 18.43	2.2724	S. 8° 40' 59.2"	12.502
WEDNESDAY 26.					FRIDAY 28.				
0	12 38 53.25	2.1092	N. 1° 24' 7.6"	12.787	0	14 23 34.92	2.2773	S. 8° 53' 28.2"	12.464
1	12 40 59.86	2.1112	1 11 19.7	12.808	1	14 25 51.71	2.2823	9 5 54.9	12.435
2	12 43 6.59	2.1132	0 58 30.6	12.827	2	14 28 8.80	2.2873	9 18 19.2	12.393
3	12 45 13.44	2.1153	0 45 40.4	12.846	3	14 30 26.18	2.2923	9 30 40.9	12.340
4	12 47 20.42	2.1175	0 32 49.1	12.864	4	14 32 43.87	2.2974	9 43 0.0	12.297
5	12 49 27.54	2.1198	0 19 56.7	12.882	5	14 35 1.87	2.3026	9 55 16.5	12.251
6	12 51 34.80	2.1222	N. 0° 7' 3.3"	12.898	6	14 37 20.18	2.3078	10 7 30.1	12.203
7	12 53 42.20	2.1245	S. 0° 5' 51.0"	12.912	7	14 39 38.81	2.3131	10 19 40.8	12.154
8	12 55 49.74	2.1269	0 18 46.1	12.925	8	14 41 57.75	2.3183	10 31 48.6	12.104
9	12 57 57.43	2.1295	0 31 42.0	12.937	9	14 44 17.01	2.3236	10 43 53.3	12.052
10	13 0 5.28	2.1321	0 44 38.6	12.949	10	14 46 36.59	2.3290	10 55 54.8	11.998
11	13 2 13.28	2.1347	0 57 35.9	12.959	11	14 48 56.49	2.3344	11 7 53.1	11.943
12	13 4 21.44	2.1374	1 10 33.7	12.968	12	14 51 16.72	2.3399	11 19 48.0	11.888
13	13 6 29.77	2.1402	1 23 32.0	12.976	13	14 53 37.28	2.3454	11 31 39.4	11.837
14	13 8 38.27	2.1430	1 36 30.8	12.983	14	14 55 58.17	2.3509	11 43 27.3	11.787
15	13 10 46.93	2.1458	1 49 30.0	12.989	15	14 58 19.39	2.3564	11 55 11.5	11.736
16	13 12 55.77	2.1489	2 2 29.5	12.993	16	15 0 40.94	2.3619	12 6 52.0	11.683
17	13 15 4.80	2.1520	2 15 29.2	12.997	17	15 3 2.82	2.3675	12 18 28.6	11.628
18	13 17 14.01	2.1551	2 28 29.1	12.999	18	15 5 25.04	2.3732	12 30 1.3	11.571
19	13 19 23.41	2.1582	2 41 29.1	13.000	19	15 7 47.60	2.3788	12 41 29.9	11.512
20	13 21 33.00	2.1614	2 54 29.1	12.999	20	15 10 10.50	2.3845	12 52 54.4	11.457
21	13 23 42.78	2.1647	3 7 29.0	12.997	21	15 12 33.74	2.3902	13 4 14.6	11.399
22	13 25 52.76	2.1681	3 20 28.8	12.995	22	15 14 57.32	2.3959	13 15 30.4	11.337
23	13 28 2.95	2.1715	3 33 28.4	12.992	23	15 17 21.25	2.4017	13 26 41.8	11.272
24	13 30 13.34	2.1750	S. 3° 46' 27.8"	12.987	24	15 19 45.52	2.4074	S. 13° 37' 48.6"	11.204

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
SATURDAY 29.					MONDAY 31.				
0	15 19 45.52	2.4074	S. 13° 37' 48".6	11.074	0	17 21 39.75	2.6535	S. 20° 29' 28".8	5.483
1	15 22 10.14	2.4132	13 48 50.7	10.996	1	17 24 19.06	2.6568	20 34 53.3	5.338
2	15 24 35.10	2.4189	13 59 48.1	10.917	2	17 26 58.57	2.6601	20 40 8.7	5.180
3	15 27 0.41	2.4247	14 10 40.7	10.835	3	17 29 38.27	2.6632	20 45 14.9	5.097
4	15 29 26.07	2.4306	14 21 28.3	10.751	4	17 32 18.16	2.6669	20 50 11.9	4.873
5	15 31 52.08	2.4363	14 32 10.8	10.666	5	17 34 58.22	2.6691	20 54 59.7	4.719
6	15 34 18.43	2.4421	14 42 48.2	10.579	6	17 37 38.45	2.6718	20 59 38.2	4.563
7	15 36 45.13	2.4479	14 53 20.3	10.490	7	17 40 18.84	2.6745	21 4 7.3	4.406
8	15 39 12.18	2.4538	15 3 47.0	10.400	8	17 42 59.39	2.6770	21 8 26.9	4.249
9	15 41 39.58	2.4596	15 14 8.3	10.308	9	17 45 40.08	2.6793	21 12 37.1	4.091
10	15 44 7.33	2.4653	15 24 24.0	10.214	10	17 48 20.91	2.6816	21 16 37.8	3.932
11	15 46 35.42	2.4711	15 34 34.0	10.119	11	17 51 1.87	2.6837	21 20 28.9	3.771
12	15 49 3.86	2.4768	15 44 38.3	10.022	12	17 53 42.95	2.6856	21 24 10.3	3.610
13	15 51 32.64	2.4826	15 54 36.7	9.923	13	17 56 24.14	2.6874	21 27 42.1	3.449
14	15 54 1.77	2.4883	16 4 29.1	9.822	14	17 59 5.84	2.6892	21 31 4.2	3.288
15	15 56 31.24	2.4940	16 14 15.4	9.720	15	18 1 46.84	2.6907	21 34 16.7	3.126
16	15 59 1.05	2.4997	16 23 55.5	9.617	16	18 4 28.32	2.6920	21 37 19.4	2.963
17	16 1 31.21	2.5055	16 33 29.4	9.512	17	18 7 9.88	2.6932	21 40 12.3	2.800
18	16 4 1.71	2.5111	16 42 56.9	9.404	18	18 9 51.51	2.6943	21 42 55.4	2.636
19	16 6 32.54	2.5167	16 52 17.9	9.295	19	18 12 33.20	2.6952	21 45 28.7	2.472
20	16 9 3.71	2.5223	17 1 32.3	9.185	20	18 15 14.94	2.6960	21 47 52.1	2.308
21	16 11 35.22	2.5279	17 10 40.1	9.073	21	18 17 56.72	2.6967	21 50 5.7	2.144
22	16 14 7.06	2.5333	17 19 41.1	8.959	22	18 20 38.54	2.6972	21 52 9.4	1.978
23	16 16 39.22	2.5387	S. 17° 28' 35".2	8.843	23	18 23 20.38	2.6976	S. 21° 54' 3.1	1.812
SUNDAY 30.					TUESDAY, JANUARY 1, 1889.				
0	16 19 11.71	2.5441	S. 17° 37' 22".3	8.727	0	18 26 2.24	2.6977	S. 21° 55' 46.9	1.647
1	16 21 44.52	2.5495	17 46 2.4	8.608	PHASES OF THE MOON.				
2	16 24 17.65	2.5549	17 54 35.3	8.488					
3	16 26 51.11	2.5602	18 3 1.0	8.367					
4	16 29 24.88	2.5654	18 11 19.3	8.243					
5	16 31 58.96	2.5706	18 19 30.2	8.119					
6	16 34 33.35	2.5757	18 27 33.6	7.993					
7	16 37 8.04	2.5807	18 35 29.4	7.865					
8	16 39 43.03	2.5857	18 43 17.4	7.735					
9	16 42 18.32	2.5906	18 50 57.6	7.604					
10	16 44 53.90	2.5954	18 58 29.9	7.472					
11	16 47 29.76	2.6001	19 5 54.3	7.339					
12	16 50 5.91	2.6048	19 13 10.6	7.204					
13	16 52 42.34	2.6094	19 20 18.8	7.067					
14	16 55 19.04	2.6138	19 27 18.7	6.929					
15	16 57 56.00	2.6182	19 34 10.3	6.791					
16	17 0 33.23	2.6226	19 40 53.6	6.651					
17	17 3 10.71	2.6267	19 47 28.4	6.508					
18	17 5 48.44	2.6308	19 53 54.6	6.365					
19	17 8 26.41	2.6349	20 0 12.2	6.222					
20	17 11 4.63	2.6389	20 6 21.2	6.077					
21	17 13 43.08	2.6427	20 12 21.4	5.930					
22	17 16 21.75	2.6464	20 18 12.8	5.782					
23	17 19 0.64	2.6500	20 23 55.3	5.633					
24	17 21 39.75	2.6535	S. 20° 29' 28".8	5.483					

● New Moon. . . Dec.

d h m

2 22 5.6

☾ First Quarter. . . . .

9 18 45.8

○ Full Moon. . . . .

17 22 40.8

☾ Last Quarter. . . . .

25 17 59.9

☾ Perigee. . . . Dec.

d h

2 15.5

☾ Apogee. . . . .

15 17.2

☾ Perigee. . . . .

31 5.7



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
4	SUN	W.	15 27 26	2401	17 10 59	2394	18 54 42	2392	20 38 28	2394
	Fomalhaut	E.	66 49 28	2961	65 2 31	2978	63 15 59	2986	61 29 54	2917
	α Pegasi	E.	83 26 55	2401	81 43 22	2414	80 0 7	2429	78 17 13	2445
5	SUN	W.	29 15 32	2435	30 58 17	2448	32 40 44	2461	34 22 52	2476
	Fomalhaut	E.	52 47 51	2448	51 5 25	2469	49 23 46	2517	47 42 57	2556
	α Pegasi	E.	69 49 15	2551	68 9 12	2577	66 29 45	2605	64 50 57	2635
6	SUN	W.	42 48 6	2558	44 27 59	2576	46 7 27	2594	47 46 30	2613
	Fomalhaut	E.	39 33 42	2608	37 59 25	2675	36 26 34	2649	34 55 17	2631
	α Pegasi	E.	56 47 59	2618	55 13 54	2693	53 40 46	2699	52 8 38	2659
	α Arietis	E.	98 24 50	2379	96 40 45	2395	94 57 3	2419	93 13 45	2429
7	SUN	W.	55 55 12	2711	57 31 37	2739	59 7 35	2759	60 43 6	2773
	VENUS	W.	18 47 11	2794	20 21 47	2811	21 56 1	2826	23 29 52	2847
	α Arietis	E.	84 43 44	2595	83 3 5	2545	81 22 54	2566	79 43 12	2586
	Aldebaran	E.	116 7 25	2375	114 23 15	2394	112 39 32	2413	110 56 16	2432
8	SUN	W.	68 34 4	2673	70 6 57	2693	71 39 25	2613	73 11 27	2633
	α Aquilæ	W.	40 16 4	4437	41 21 1	4390	42 27 35	4396	43 35 37	4143
	VENUS	W.	31 12 59	2945	32 44 21	2964	34 15 19	2984	35 45 52	3004
	MARS	W.	20 29 48	2781	22 4 41	2803	23 39 6	2822	25 13 5	2843
	α Arietis	E.	71 31 53	2694	69 55 5	2716	68 18 47	2740	66 43 0	2763
	Aldebaran	E.	102 26 39	2537	100 46 3	2545	99 5 53	2564	97 26 9	2583
9	SUN	W.	80 45 28	3029	82 15 5	3047	83 44 20	3065	85 13 12	3082
	α Aquilæ	W.	49 32 40	3692	50 46 38	3694	52 1 15	3792	53 16 26	3763
	VENUS	W.	43 12 36	3099	44 40 47	3117	46 8 36	3135	47 36 3	3153
	MARS	W.	32 56 51	2935	34 28 25	2954	35 59 36	2971	37 30 25	2989
	α Arietis	E.	58 51 40	2681	57 18 57	2696	55 46 46	2631	54 15 7	2657
	Aldebaran	E.	89 13 40	2672	87 36 22	2699	85 59 27	2705	84 22 54	2731
10	SUN	W.	92 32 18	3167	93 59 7	3189	95 25 38	3198	96 51 50	3212
	α Aquilæ	W.	59 38 42	3667	60 56 4	3655	62 13 39	3645	63 31 25	3635
	VENUS	W.	54 48 4	3237	56 13 29	3253	57 38 35	3268	59 3 24	3283
	MARS	W.	44 59 8	3072	46 27 52	3087	47 56 18	3101	49 24 26	3116
	α Arietis	E.	46 45 14	3098	45 17 2	3129	43 49 28	3169	42 22 33	3197
	Aldebaran	E.	76 25 26	2799	74 50 57	2813	73 16 46	2828	71 42 54	2842
11	SUN	W.	103 58 40	3280	105 23 15	3293	106 47 35	3304	108 11 42	3316
	α Aquilæ	W.	70 2 1	3613	71 20 21	3612	72 38 42	3611	73 57 4	3611
	VENUS	W.	66 3 16	3351	67 26 28	3364	68 49 26	3376	70 12 10	3387
	MARS	W.	56 40 50	3183	58 7 20	3195	59 33 35	3207	60 59 36	3218
	Fomalhaut	W.	34 43 8	3600	36 1 42	3563	37 20 57	3529	38 40 49	3506
	Aldebaran	E.	63 57 49	2904	62 25 35	2916	60 53 36	2926	59 21 50	2937
12	SUN	W.	115 9 7	3366	116 32 2	3376	117 54 46	3384	119 17 21	3392
	α Aquilæ	W.	80 28 41	3620	81 46 54	3623	83 5 3	3627	84 23 8	3632
	VENUS	W.	77 2 44	3438	78 24 17	3447	79 45 10	3455	81 6 54	3463
	MARS	W.	68 6 33	3268	69 31 22	3276	70 56 1	3284	72 20 31	3292
	Fomalhaut	W.	45 26 53	3405	46 49 4	3392	48 11 30	3381	49 34 8	3372
	α Pegasi	W.	34 18 7	4501	35 21 58	4399	36 27 20	4396	37 34 5	4292

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
4	SUN	W.	22° 22' 12"	9398	24° 5' 49"	9405	25° 49' 16"	9414	27° 32' 31"	9424
	Fomalhaut	E.	59 44 19	9239	57 59 17	9264	56 14 50	9389	54 31 0	9418
	α Pegasi	E.	76 34 43	9463	74 52 38	9489	73 11 0	9504	71 29 52	9526
5	SUN	W.	36 4 39	9492	37 46 4	9507	39 27 7	9523	41 7 48	9540
	Fomalhaut	E.	46 3 1	9598	44 24 3	9643	42 46 7	9693	41 9 18	9748
	α Pegasi	E.	63 12 50	9667	61 35 26	9701	59 58 48	9738	58 22 58	9776
6	SUN	W.	49 25 7	9632	51 3 18	9652	52 41 2	9672	54 18 20	9691
	Fomalhaut	E.	33 25 43	3124	31 58 3	3229	30 32 28	3248	29 9 12	3285
	α Pegasi	E.	50 37 34	3014	49 7 38	3071	47 38 53	3133	46 11 24	3201
	α Arietis	E.	91 30 52	2448	89 48 25	2486	88 6 24	2485	86 24 50	2505
7	SUN	W.	62 18 11	2792	63 52 49	2813	65 27 0	2833	67 0 45	2853
	VENUS	W.	25 3 19	2866	26 36 21	2885	28 8 59	2905	29 41 12	2925
	α Arietis	E.	78 3 58	2807	76 25 13	2829	74 46 57	2850	73 9 10	2872
	Aldebaran	E.	109 13 27	2451	107 31 5	2470	105 49 10	2489	104 7 41	2508
8	SUN	W.	74 43 4	2953	76 14 16	2979	77 45 4	2991	79 15 28	3010
	α Aquilæ	W.	44 44 57	4071	45 55 27	4008	47 6 59	3953	48 19 25	3905
	VENUS	W.	37 16 0	3023	38 45 44	3042	40 15 5	3061	41 44 2	3080
	MARS	W.	26 46 39	2861	28 19 48	2880	29 52 33	2898	31 24 54	2917
	α Arietis	E.	65 7 43	2786	63 32 57	2809	61 58 41	2832	60 24 55	2856
	Aldebaran	E.	95 46 50	2801	94 7 56	2819	92 29 27	2837	90 51 22	2854
9	SUN	W.	86 41 43	3100	88 9 53	3117	89 37 42	3134	91 5 10	3151
	α Aquilæ	W.	54 32 7	3738	55 48 14	3716	57 4 44	3697	58 21 34	3680
	VENUS	W.	49 3 8	3171	50 29 52	3188	51 56 16	3204	53 22 20	3221
	MARS	W.	39 0 51	3006	40 30 56	3023	42 0 40	3039	43 30 4	3056
	α Arietis	E.	52 44 0	2983	51 13 26	3011	49 43 27	3039	48 14 3	3068
	Aldebaran	E.	82 46 42	2737	81 10 51	2753	79 35 22	2769	78 0 14	2785
10	SUN	W.	98 17 45	3296	99 43 23	3240	101 8 45	3254	102 33 50	3267
	α Aquilæ	W.	64 49 20	3629	66 7 23	3624	67 25 31	3620	68 43 44	3616
	VENUS	W.	60 27 55	3298	61 52 9	3312	63 16 7	3325	64 39 49	3338
	MARS	W.	50 52 16	3130	52 19 49	3144	53 47 5	3168	55 14 5	3170
	α Arietis	E.	40 56 20	3233	39 30 50	3271	38 6 5	3313	36 42 8	3358
	Aldebaran	E.	70 9 20	2855	68 36 3	2867	67 3 2	2880	65 30 18	2892
11	SUN	W.	109 35 35	3397	110 59 15	3337	112 22 44	3347	113 46 1	3357
	α Aquilæ	W.	75 15 26	3612	76 33 47	3613	77 52 7	3615	79 10 25	3617
	VENUS	W.	71 34 41	3399	72 56 59	3409	74 19 5	3419	75 41 0	3429
	MARS	W.	62 25 24	3229	63 50 59	3239	65 16 22	3249	66 41 33	3259
	Fomalhaut	W.	40 1 13	3475	41 22 5	3454	42 43 21	3435	44 4 58	3419
	Aldebaran	E.	57 50 18	2947	56 18 59	2957	54 47 52	2966	53 16 57	2976
12	SUN	W.	120 39 47	3400	122 2 4	3407	123 24 13	3413	124 46 15	3420
	α Aquilæ	W.	85 41 8	3635	86 59 4	3640	88 16 55	3646	89 34 40	3651
	VENUS	W.	82 27 59	3471	83 48 55	3479	85 9 43	3485	86 30 24	3491
	MARS	W.	73 44 52	3300	75 9 4	3306	76 33 8	3313	77 57 4	3319
	Fomalhaut	W.	50 56 56	3364	52 19 54	3356	53 43 1	3349	55 6 16	3343
	α Pegasi	W.	38 42 5	4156	39 51 13	4092	41 1 22	4035	42 12 27	3984

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
12	Aldebaran	E.	51° 46' 14"	2985	50° 15' 42"	2993	48° 45' 20"	3000	47° 15' 7"	3007
	Pollux	E.	96 0 11	3009	94 30 10	3018	93 0 19	3026	91 30 38	3033
13	SUN	W.	126 8 9	3426	127 29 56	3431	128 51 37	3437	130 13 12	3442
	VENUS	W.	87 50 58	3497	89 11 25	3503	90 31 46	3507	91 52 2	3512
	MARS	W.	79 20 53	3325	80 44 35	3331	82 8 11	3336	83 31 41	3340
	Fomalhaut	W.	56 29 38	3338	57 53 6	3333	59 16 39	3329	60 40 17	3325
	α Pegasi	W.	43 24 22	3938	44 37 3	3996	45 50 27	3958	47 4 29	3994
	Aldebaran	E.	39 46 15	3040	38 16 52	3045	36 47 35	3051	35 18 25	3056
	Pollux	E.	84 4 18	3064	82 35 24	3069	81 6 37	3073	79 37 55	3078
14	VENUS	W.	98 32 11	3531	99 52 1	3533	101 11 49	3535	102 31 34	3537
	Fomalhaut	W.	67 39 29	3310	69 3 29	3307	70 27 32	3305	71 51 38	3302
	α Pegasi	W.	53 22 33	3993	54 39 28	3973	55 56 44	3953	57 14 21	3936
	Pollux	E.	72 15 44	3097	70 47 31	3101	69 19 22	3103	67 51 16	3105
	SATURN	E.	100 0 12	3057	98 31 10	3060	97 2 11	3061	95 33 14	3063
	Regulus	E.	108 1 46	3070	106 33 0	3072	105 4 16	3074	103 35 34	3076
15	Fomalhaut	W.	78 52 45	3293	80 17 5	3291	81 41 27	3289	83 5 51	3286
	α Pegasi	W.	63 46 40	3566	65 5 51	3555	66 25 15	3544	67 44 51	3534
	Pollux	E.	60 31 25	3114	59 3 33	3116	57 35 43	3117	56 7 54	3119
	SATURN	E.	88 8 52	3068	86 40 3	3068	85 11 14	3067	83 42 24	3066
	Regulus	E.	96 12 33	3081	94 44 0	3081	93 15 27	3080	91 46 53	3079
16	Fomalhaut	W.	90 8 20	3280	91 32 55	3278	92 57 32	3277	94 22 10	3276
	α Pegasi	W.	74 25 25	3491	75 45 59	3484	77 6 41	3478	78 27 30	3471
	α Arietis	W.	30 57 55	3681	32 15 2	3629	33 33 5	3584	34 51 57	3545
	Pollux	E.	48 49 10	3123	47 21 28	3124	45 53 48	3125	44 26 9	3126
	SATURN	E.	76 18 1	3061	74 49 4	3060	73 20 5	3058	71 51 4	3056
	Regulus	E.	84 23 53	3075	82 55 13	3073	81 26 31	3072	79 57 47	3069
17	α Pegasi	W.	85 13 13	3446	86 34 38	3441	87 56 8	3438	89 17 42	3433
	α Arietis	W.	41 35 39	3401	42 57 55	3379	44 20 35	3359	45 43 38	3340
	Pollux	E.	37 8 18	3135	35 40 51	3139	34 13 29	3143	32 46 12	3148
	SATURN	E.	64 25 15	3043	62 55 55	3040	61 26 32	3037	59 57 5	3034
	Regulus	E.	72 33 25	3057	71 4 23	3055	69 35 18	3052	68 6 9	3049
18	α Arietis	W.	52 43 52	3264	54 8 46	3250	55 33 56	3238	56 59 20	3226
	Aldebaran	W.	19 40 37	3044	21 9 55	3038	22 39 21	3031	24 8 55	3025
	SATURN	E.	52 28 46	3015	50 58 52	3011	49 28 53	3007	47 58 49	3002
	Regulus	E.	60 39 25	3030	59 9 50	3027	57 40 11	3023	56 10 27	3018
19	α Arietis	W.	64 9 39	3174	65 36 19	3164	67 3 11	3155	68 30 14	3147
	Aldebaran	W.	31 38 36	2997	33 8 53	2990	34 39 18	2985	36 9 50	2979
	SATURN	E.	40 27 4	2980	38 56 26	2974	37 25 41	2969	35 54 50	2965
	Regulus	E.	48 40 26	2997	47 10 9	2992	45 39 46	2988	44 9 18	2983
	Spica	E.	102 36 16	3025	101 6 34	3019	99 36 45	3014	98 6 49	3009
20	α Arietis	W.	75 48 5	3104	77 16 10	3098	78 44 24	3088	80 12 48	3080
	Aldebaran	W.	43 44 21	2948	45 15 39	2942	46 47 4	2936	48 18 37	2929
	Regulus	E.	36 35 25	2958	35 4 20	2953	33 33 8	2948	32 1 50	2942
	Spica	E.	90 35 26	2979	89 4 47	2973	87 34 0	2967	86 3 6	2961

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
12	Aldebaran E.	45 45 3	3015	44 15 9	3022	42 45 23	3088	41 15 45	3034
	Pollux E.	90 1 6	3040	88 31 43	3046	87 2 27	3052	85 33 19	3058
13	SUN W.	131 34 41	3446	132 56 5	3450	134 17 25	3454	135 38 40	3458
	VENUS W.	93 12 13	3516	94 32 19	3520	95 52 21	3525	97 12 18	3528
	MARS W.	84 55 6	3345	86 18 26	3349	87 41 41	3352	89 4 52	3355
	Fomalhaut W.	62 4 0	3391	63 27 47	3318	64 51 38	3315	66 15 32	3313
	α Pegasi W.	48 19 6	3792	49 34 16	3765	50 49 55	3739	52 6 1	3714
	Aldebaran E.	33 49 21	3060	32 20 22	3065	30 51 29	3069	29 22 41	3072
	Pollux E.	78 9 19	3082	76 40 48	3087	75 12 22	3091	73 44 1	3094
14	VENUS W.	103 51 17	3539	105 10 58	3540	106 30 38	3541	107 50 17	3541
	Fomalhaut W.	73 15 47	3300	74 39 58	3299	76 4 11	3296	77 28 27	3294
	α Pegasi W.	58 32 16	3690	59 50 29	3605	61 8 58	3591	62 27 42	3578
	Pollux E.	66 23 13	3108	64 55 13	3110	63 27 15	3111	61 59 19	3113
	SATURN E.	94 4 19	3064	92 35 25	3065	91 6 33	3066	89 37 42	3067
	Regulus E.	102 6 55	3078	100 38 18	3078	99 9 42	3079	97 41 7	3080
15	Fomalhaut W.	84 30 17	3286	85 54 45	3284	87 19 15	3282	88 43 47	3282
	α Pegasi W.	69 4 38	3525	70 24 35	3515	71 44 42	3506	73 4 59	3498
	Pollux E.	54 40 7	3119	53 12 21	3120	51 44 36	3121	50 16 52	3123
	SATURN E.	82 13 33	3066	80 44 42	3065	79 15 50	3064	77 46 56	3063
	Regulus E.	90 18 18	3079	88 49 43	3079	87 21 8	3078	85 52 31	3077
16	Fomalhaut W.	95 46 50	3275	97 11 31	3274	98 36 13	3273	100 0 56	3272
	α Pegasi W.	79 48 26	3465	81 9 29	3460	82 30 38	3454	83 51 53	3450
	α Arietis W.	36 11 32	3510	37 31 45	3480	38 52 32	3451	40 13 51	3425
	Pollux E.	42 58 31	3128	41 30 55	3129	40 3 20	3131	38 35 48	3133
	SATURN E.	70 22 0	3054	68 52 54	3052	67 23 45	3048	65 54 32	3045
	Regulus E.	78 29 0	3067	77 0 10	3065	75 31 18	3063	74 2 23	3060
17	α Pegasi W.	90 39 21	3430	92 1 4	3428	93 22 49	3426	94 44 36	3424
	α Arietis W.	47 7 3	3393	48 30 48	3306	49 54 52	3291	51 19 14	3277
	Pollux E.	31 19 0	3153	29 51 55	3161	28 24 59	3170	26 58 14	3181
	SATURN E.	58 27 34	3030	56 57 59	3026	55 28 19	3023	53 58 35	3019
	Regulus E.	66 36 57	3046	65 7 41	3042	63 38 20	3039	62 8 55	3034
18	α Arietis W.	58 24 58	3215	59 50 49	3204	61 16 53	3193	62 43 10	3183
	Aldebaran W.	25 38 37	3019	27 8 26	3014	28 38 22	3007	30 8 26	3002
	SATURN E.	46 28 39	2998	44 58 24	2993	43 28 3	2989	41 57 36	2985
	Regulus E.	54 40 37	3014	53 10 42	3010	51 40 42	3006	50 10 37	3001
19	α Arietis W.	69 57 27	3138	71 24 51	3129	72 52 25	3120	74 20 10	3112
	Aldebaran W.	37 40 29	2973	39 11 15	2967	40 42 9	2961	42 13 11	2954
	SATURN E.	34 23 53	2959	32 52 49	2954	31 21 39	2949	29 50 22	2943
	Regulus E.	42 38 44	2978	41 8 4	2973	39 37 17	2968	38 6 24	2963
	Spica E.	96 36 47	3003	95 6 38	2997	93 36 21	2991	92 5 57	2985
20	α Arietis W.	81 41 22	3073	83 10 5	3065	84 38 58	3057	86 8 0	3050
	Aldebaran W.	49 50 19	2922	51 22 10	2916	52 54 9	2909	54 26 17	2901
	Regulus E.	30 30 25	2938	28 58 54	2934	27 27 18	2929	25 55 36	2924
	Spica E.	84 32 4	2954	83 0 54	2947	81 29 35	2941	79 58 8	2935

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
21	$\alpha$ Arietis W.	87° 37' 11"	3043	89° 6' 32"	3034	90° 36' 2"	3027	92° 5' 41"	3020
	Aldebaran W.	55 58 35	2994	57 31 2	2987	59 3 38	2979	60 36 24	2970
	Spica E.	78 26 33	2927	76 54 49	2921	75 22 57	2914	73 50 56	2906
22	Aldebaran W.	68 22 51	2930	69 56 40	2921	71 30 41	2911	73 4 54	2901
	Pollux W.	24 54 1	2986	26 24 31	2960	27 55 34	2937	29 27 6	2916
	Spica E.	66 8 30	2989	64 35 32	2993	63 2 25	2955	61 29 8	2946
	SUN E.	134 50 2	3199	133 23 52	3189	131 57 30	3179	130 30 56	3168
23	Aldebaran W.	80 59 8	2753	82 34 38	2743	84 10 21	2732	85 46 18	2720
	Pollux W.	37 10 53	2928	38 44 44	2912	40 18 56	2797	41 53 28	2789
	Spica E.	53 40 6	2907	52 5 47	2798	50 31 17	2791	48 56 37	2783
	Antares E.	99 33 46	2795	97 59 12	2785	96 24 24	2774	94 49 22	2763
	SUN E.	123 14 55	3114	121 47 3	3103	120 18 57	3091	118 50 37	3079
24	Aldebaran W.	93 49 52	2963	95 27 21	2951	97 5 7	2938	98 43 10	2926
	Pollux W.	49 50 59	2709	51 27 27	2695	53 4 13	2981	54 41 18	2966
	SATURN W.	22 2 57	2957	23 40 35	2943	25 18 32	2929	26 56 47	2916
	Spica E.	41 0 48	2747	39 25 11	2741	37 49 26	2735	36 13 33	2731
	Antares E.	86 50 27	2704	85 13 53	2693	83 37 4	2681	81 59 59	2669
	SUN E.	111 25 10	3017	109 55 18	3003	108 25 9	2989	106 54 42	2975
25	Pollux W.	62 51 38	2594	64 30 41	2580	66 10 4	2564	67 49 48	2550
	SATURN W.	35 12 37	2548	36 52 44	2533	38 33 11	2520	40 13 57	2506
	Regulus W.	26 53 17	2581	28 32 38	2564	30 12 22	2548	31 52 28	2533
	Antares E.	73 50 22	2906	72 11 35	2593	70 32 31	2580	68 53 9	2568
	SUN E.	99 18 8	2904	97 45 54	2939	96 13 21	2974	94 40 29	2959
26	Pollux W.	76 13 34	2475	77 55 22	2460	79 37 31	2445	81 20 1	2431
	SATURN W.	48 42 46	2433	50 25 34	2418	52 8 43	2403	53 52 13	2389
	Regulus W.	40 18 19	2456	42 0 34	2441	43 43 11	2426	45 26 9	2410
	Antares E.	60 31 57	2504	58 50 50	2492	57 9 25	2480	55 27 43	2467
	SUN E.	86 51 14	2782	85 16 22	2766	83 41 9	2750	82 5 35	2734
27	Pollux W.	89 57 50	2356	91 42 28	2342	93 27 26	2328	95 12 45	2313
	SATURN W.	62 35 2	2315	64 20 40	2300	66 6 39	2285	67 53 0	2271
	Regulus W.	54 6 27	2335	55 51 36	2320	57 37 6	2305	59 22 58	2290
	Antares E.	46 55 8	2413	45 11 52	2404	43 28 23	2396	41 44 42	2389
	SUN E.	74 2 29	2655	72 24 48	2639	70 46 46	2624	69 8 23	2608
28	SATURN W.	76 49 59	2901	78 38 25	2188	80 27 10	2175	82 16 15	2163
	Regulus W.	68 17 37	2990	70 5 35	2907	71 53 52	2194	73 42 29	2181
	SUN E.	60 51 13	2533	59 10 45	2519	57 29 58	2504	55 48 51	2492
29	SATURN W.	91 26 18	2105	93 17 10	2094	95 8 19	2084	96 59 43	2075
	Regulus W.	82 50 12	2122	84 40 37	2112	86 31 18	2102	88 22 14	2094
	Spica W.	29 34 40	2980	31 21 39	2935	33 9 14	2913	34 57 22	2193
	SUN E.	47 18 43	2422	45 35 49	2418	43 52 40	2408	42 9 16	2397
30	Regulus W.	97 40 12	2054	99 32 22	2048	101 24 41	2042	103 17 9	2036
	Spica W.	44 4 31	2121	45 54 58	2110	47 45 42	2101	49 36 40	2093
	SUN E.	33 28 55	2356	31 44 17	2350	29 59 30	2344	28 14 35	2339

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
21	$\alpha$ Arietis	W.	93° 35' 29"	3013	95° 5' 26"	3005	96° 35' 33"	2997	98° 5' 49"	2991
	Aldebaran	W.	62 9 21	2863	63 42 28	2855	65 15 45	2846	66 49 13	2838
	Spica	E.	72 18 45	2899	70 46 25	2899	69 13 56	2885	67 41 18	2877
22	Aldebaran	W.	74 39 20	2792	76 13 58	2783	77 48 48	2773	79 23 51	2763
	Pollux	W.	30 59 4	2897	32 31 27	2878	34 4 14	2861	35 37 23	2845
	Spica	E.	59 55 40	2838	58 22 2	2831	56 48 14	2822	55 14 15	2815
	SUN	E.	129 4 9	3158	127 37 10	3148	126 9 58	3137	124 42 33	3126
23	Aldebaran	W.	87 22 31	2709	88 58 59	2698	90 35 42	2687	92 12 39	2675
	Pollux	W.	43 28 20	2767	45 3 31	2753	46 39 1	2738	48 14 50	2723
	Spica	E.	47 21 47	2775	45 46 47	2768	44 11 37	2760	42 36 17	2753
	Antares	E.	93 14 5	2759	91 38 34	2740	90 2 47	2729	88 26 45	2716
	SUN	E.	117 22 2	3067	115 53 12	3055	114 24 7	3049	112 54 46	3030
24	Aldebaran	W.	100 21 30	2613	102 0 7	2600	103 39 2	2587	105 18 15	2574
	Pollux	W.	56 18 43	2652	57 56 27	2638	59 34 31	2623	61 12 55	2609
	SATURN	W.	28 35 20	2692	30 14 12	2689	31 53 22	2676	33 32 50	2662
	Spica	E.	34 37 34	2728	33 1 31	2726	31 25 25	2725	29 49 18	2727
	Antares	E.	80 22 37	2656	78 44 58	2644	77 7 3	2639	75 28 51	2619
	SUN	E.	105 23 58	2962	103 52 57	2948	102 21 39	2934	100 50 3	2919
25	Pollux	W.	69 29 52	2535	71 10 16	2520	72 51 1	2505	74 32 7	2490
	SATURN	W.	41 55 2	2492	43 36 27	2477	45 18 13	2462	47 0 19	2448
	Regulus	W.	33 32 55	2517	35 13 44	2509	36 54 54	2487	38 36 26	2479
	Antares	E.	67 13 30	2555	65 33 33	2543	63 53 19	2530	62 12 47	2517
	SUN	E.	93 7 18	2844	91 33 47	2828	89 59 56	2813	88 25 45	2798
26	Pollux	W.	83 2 52	2416	84 46 4	2401	86 29 38	2386	88 13 33	2371
	SATURN	W.	55 36 4	2374	57 20 16	2359	59 4 50	2344	60 49 45	2329
	Regulus	W.	47 9 29	2395	48 53 11	2380	50 37 15	2365	52 21 40	2350
	Antares	E.	53 45 44	2456	52 3 29	2444	50 20 57	2433	48 38 10	2423
	SUN	E.	80 29 40	2718	78 53 24	2702	77 16 47	2687	75 39 49	2670
27	Pollux	W.	96 58 25	2299	98 44 26	2285	100 30 47	2272	102 17 28	2259
	SATURN	W.	69 39 42	2257	71 26 45	2243	73 14 9	2229	75 1 54	2215
	Regulus	W.	61 9 12	2276	62 55 47	2262	64 42 43	2247	66 30 0	2234
	Antares	E.	40 0 51	2322	38 16 51	2318	36 32 44	2314	34 48 32	2312
	SUN	E.	67 29 39	2593	65 50 34	2577	64 11 8	2562	62 31 21	2547
28	SATURN	W.	84 5 39	2150	85 55 22	2138	87 45 23	2126	89 35 42	2115
	Regulus	W.	75 31 25	2169	77 20 40	2157	79 10 13	2145	81 0 4	2134
	SUN	E.	54 7 26	2478	52 25 42	2465	50 43 40	2453	49 1 20	2441
29	SATURN	W.	98 51 21	2066	100 43 13	2057	102 35 18	2050	104 27 35	2042
	Regulus	W.	90 13 23	2064	92 4 46	2075	93 56 23	2068	95 48 12	2061
	Spica	W.	36 46 0	2176	38 35 4	2160	40 24 32	2145	42 14 22	2133
	SUN	F.	40 25 37	2388	38 41 45	2379	36 57 40	2371	35 13 23	2363
30	Regulus	W.	105 9 44	2034	107 2 25	2031	108 55 11	2028	110 48 1	2026
	Spica	W.	51 27 50	2066	53 19 11	2060	55 10 41	2075	57 2 19	2070
	SUN	E.	26 29 32	2335	24 44 23	2332	22 59 10	2330	21 13 54	2328

## GREENWICH MEAN TIME.

GREENWICH MEAN TIME.											
JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	18 1 50.82	+16 948	-24 18 41.5	-14.56	23 22.3	1	21 39 19.85	+17.009	-15 47 58.1	+ 98.90	0 54.9
2	18 8 38.63	17.035	24 23 52.3	11.34	23 25.2	2	21 46 7.36	16.894	15 7 46.4	102.04	0 57.7
3	18 15 28.48	17.118	24 27 45.2	8.06	23 28.1	3	21 52 50.53	16.808	14 26 21.8	104.97	1 0.5
4	18 22 20.24	17.195	24 30 19.0	4.75	23 31.1	4	21 59 28.57	16.466	13 43 49.8	107.65	1 3.2
5	18 29 13.81	17.268	24 31 32.6	- 1.38	23 34.1	5	22 6 0.57	16.194	13 0 17.2	110.01	1 5.8
6	18 36 9.07	+17.336	-24 31 24.0	+ 2.05	23 37.1	6	22 12 25.53	+15.878	-12 15 52.3	+112.00	1 8.3
7	18 43 5.92	17.400	24 29 54.0	5.52	23 40.1	7	22 18 42.33	15.512	11 30 44.5	113.57	1 10.6
8	18 50 4.25	17.460	24 26 59.6	9.03	23 43.2	8	22 24 49.66	15.089	10 45 5.0	114.64	1 12.8
9	18 57 3.95	17.515	24 22 40.3	12.58	23 46.2	9	22 30 46.08	14.601	9 59 6.5	115.14	1 14.8
10	19 4 4.90	17.565	24 16 55.2	16.18	23 49.3	10	22 36 29.95	14.049	9 13 3.5	115.90	1 16.6
11	19 11 7.01	+17.611	-24 9 43.3	+19.82	23 52.5	11	22 41 59.48	+13.406	- 8 27 12.4	+114.14	1 18.1
12	19 18 10.16	17.652	24 1 3.6	23.49	23 55.6	12	22 47 12.77	12.686	7 41 51.3	112.48	1 19.4
13	19 25 14.24	17.688	23 50 55.4	27.90	23 58.7	13	22 52 7.72	11.878	6 57 20.1	109.97	1 20.3
14	19 32 19.13	17.719	23 39 17.7	30.94		14	22 56 42.16	10.977	6 14 0.3	108.58	1 20.9
15	19 39 24.71	17.745	23 26 9.9	34.79	0 1.9	15	23 0 53.83	9.990	5 32 14.8	102.10	1 21.9
16	19 46 30.86	+17.766	-23 11 31.1	+36.52	0 5.1	16	23 4 40.46	+ 8.890	- 4 52 27.4	+ 96.68	1 21.0
17	19 53 37.46	17.788	22 55 20.7	49.35	0 8.2	17	23 7 59.84	7.710	4 15 2.4	90.23	1 20.3
18	20 0 44.38	17.793	22 37 38.1	46.90	0 11.4	18	23 10 49.87	6.444	3 40 24.5	82.76	1 19.2
19	20 7 51.48	17.798	22 18 23.0	50.07	0 14.6	19	23 13 8.60	5.105	3 8 57.9	74.29	1 17.5
20	20 14 58.63	17.797	21 57 34.9	53.95	0 17.8	20	23 14 54.43	3.704	2 41 5.9	64.88	1 15.3
21	20 22 5.70	+17.791	-21 35 13.3	+57.85	0 21.0	21	23 16 6.04	+ 2.957	- 2 17 10.2	+ 54.68	1 12.5
22	20 29 12.53	17.777	21 11 18.0	61.75	0 24.1	22	23 16 42.60	+ 0.787	1 57 30.0	43.61	1 9.2
23	20 36 18.94	17.756	20 45 49.2	65.65	0 27.3	23	23 16 43.83	- 0.689	1 42 21.6	31.99	1 5.2
24	20 43 24.76	17.728	20 18 46.9	69.54	0 30.5	24	23 16 10.07	2.194	1 31 57.8	19.94	1 0.7
25	20 50 29.80	17.691	19 50 11.2	73.42	0 33.6	25	23 15 2.33	3.508	1 26 26.3	+ 7.86	0 55.7
26	20 57 33.82	+17.643	-19 20 2.9	+77.27	0 36.8	26	23 13 22.38	- 4.804	- 1 25 49.9	- 4.61	0 50.1
27	21 4 36.56	17.584	18 48 22.7	81.07	0 39.9	27	23 11 12.72	5.978	1 30 5.3	16.61	0 44.0
28	21 11 37.75	17.513	18 15 11.8	84.83	0 42.9	28	23 8 36.61	7.003	1 39 2.8	28.04	0 37.4
29	21 18 37.07	17.428	17 40 31.5	88.51	0 46.0	29	23 5 37.99	7.850	1 52 26.4	38.75	0 30.5
30	21 25 34.16	17.327	17 4 24.1	92.09	0 49.0	30	23 2 21.36	8.500	2 9 53.2	48.31	0 23.3
31	21 32 28.59	+17.206	-16 26 52.0	+95.57	0 52.0	31	22 58 51.66	- 8.828	- 2 30 54.9	- 56.60	0 15.9
32	21 39 19.85	+17.092	-15 47 58.1	+98.90	0 54.9	32	22 55 14.06	- 9.158	- 2 54 58.2	- 63.42	0 8.4
Day of the Month.						Day of the Month.					
1st. 6th. 11th. 16th. 21st. 26th. 31st.						5th. 10th. 15th. 20th. 25th.					
Semidiameter . .						Semidiameter . . . . .					
Hor. Parallax . .						Horizontal Parallax . .					
2.4 2.4 2.3 2.3 2.4 2.4 2.5						2.7 3.0 3.4 4.0 4.6					
6.3 6.2 6.2 6.2 6.3 6.5 6.8						7.2 7.9 9.0 10.5 12.2					
Note.—The sign + indicates north declinations; the sign — indicates south declinations.											

NOTE.—The sign + indicates north declinations: the sign — indicates south declinations.

## GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>
1	23 9 21.36	- 8.500	-2 9 53.2	-48.31	0 23.3	1	23 5 34.77	+10.940	- 7 47 4.0	+ 44.31	22 24.7
2	22 58 51.66	8.938	2 30 54.9	56.60	0 15.9	2	23 9 44.70	10.585	7 28 32.3	48.31	22 25.0
3	22 55 14.06	9.158	2 54 58.2	63.48	0 8.4	3	23 14 2.67	10.910	7 8 26.0	52.90	22 25.5
4	22 51 33.81	9.160	3 21 26.6	68.67	0 0 9.2	4	23 18 28.23	11.218	6 46 47.7	55.97	22 26.1
5	22 47 56.01	8.956	3 49 41.3	73.29	23 45.9	5	23 23 1.00	11.511	6 23 40.2	59.84	22 26.8
6	22 44 25.40	- 8.564	-4 19 3.7	-74.31	23 38.7	6	23 27 40.64	+11.790	- 5 59 5.7	+ 63.29	22 27.6
7	22 41 6.27	8.005	4 48 56.1	74.69	23 31.7	7	23 32 26.85	12.058	5 33 6.6	66.70	22 28.6
8	22 38 2.31	7.304	5 18 43.8	73.94	23 25.0	8	23 37 19.37	12.317	5 5 45.0	70.08	22 29.6
9	22 35 16.59	6.487	5 47 55.2	71.82	23 18.7	9	23 42 17.96	12.566	4 37 3.2	73.28	22 30.7
10	22 32 51.50	5.591	6 16 3.1	68.68	23 12.7	10	23 47 22.46	12.808	4 7 3.1	76.61	22 31.9
11	22 30 48.69	- 4.635	-6 42 45.3	-64.70	23 7.1	11	23 52 32.72	+13.045	- 3 35 46.7	+ 79.75	22 33.3
12	22 29 9.32	3.642	7 7 43.3	60.04	23 1.9	12	23 57 48.60	13.278	3 3 15.9	82.80	22 34.7
13	22 27 53.99	2.635	7 30 43.0	54.87	22 57.1	13	0 3 10.04	13.508	2 29 32.8	85.78	22 36.2
14	22 27 2.84	1.630	7 51 34.3	49.35	22 52.7	14	0 8 36.99	13.736	1 54 39.3	88.67	22 37.8
15	22 26 35.64	- 0.641	8 10 10.0	43.58	22 48.7	15	0 14 9.43	13.965	1 18 37.2	91.49	22 39.4
16	22 26 31.88	+ 0.322	-8 26 25.3	-37.86	22 45.1	16	0 19 47.35	+14.185	- 0 41 28.2	+ 94.94	22 41.2
17	22 26 50.81	1.949	8 40 18.3	31.74	22 41.8	17	0 25 30.81	14.427	- 0 3 14.4	96.90	22 43.1
18	22 27 31.52	2.138	8 51 48.7	25.80	22 38.9	18	0 31 19.88	14.663	+ 0 36 2.5	99.49	22 45.1
19	22 28 33.00	2.979	9 0 57.2	19.92	22 36.3	19	0 37 14.65	14.908	1 16 20.4	101.99	22 47.2
20	22 29 54.18	3.778	9 7 45.7	14.14	22 34.0	20	0 43 15.23	15.147	1 57 37.3	104.40	22 49.3
21	22 31 33.99	+ 4.531	-9 12 16.8	- 8.48	22 32.0	21	0 49 21.76	+15.368	+ 2 39 51.0	+106.79	22 51.6
22	22 33 31.31	5.238	9 14 33.5	- 2.94	22 30.2	22	0 55 34.40	15.657	3 22 59.3	108.95	22 54.0
23	22 35 45.08	5.902	9 14 39.1	+ 9.44	22 28.8	23	1 1 53.35	15.994	4 6 59.7	111.07	22 56.4
24	22 38 14.25	6.523	9 12 37.2	7.68	22 27.6	24	1 8 18.81	16.300	4 51 49.7	113.08	22 59.0
25	22 40 57.84	7.103	9 8 31.7	12.76	22 26.6	25	1 14 51.00	16.484	5 37 26.4	114.96	23 1.7
26	22 43 54.89	+ 7.645	-9 2 26.0	+17.69	22 25.8	26	1 21 30.13	+16.779	+ 6 23 46.6	+116.70	23 4.6
27	22 47 4.52	8.152	8 54 23.8	22.47	22 25.1	27	1 28 16.46	17.064	7 10 46.7	118.28	23 7.6
28	22 50 25.92	8.696	8 44 28.7	27.10	22 24.7	28	1 35 10.23	17.399	7 58 22.9	119.70	23 10.6
29	22 53 58.32	9.069	8 32 43.9	31.61	22 24.5	29	1 42 11.68	17.734	8 46 30.9	120.93	23 13.8
30	22 57 41.02	9.485	8 19 12.7	35.97	22 24.4	30	1 49 21.06	18.059	9 35 5.8	121.94	23 17.2
31	23 1 33.37	+ 9.874	-8 3 58.4	+40.20	22 24.5	31	1 56 38.57	+18.402	+10 24 2.2	+122.79	23 20.7
32	23 5 34.77	+10.940	-7 47 4.0	+44.31	22 24.7	32	2 4 4.40	+18.759	+11 13 14.1	+123.22	23 24.3

Day of the Month.	1st.	5th.	11th.	16th.	21st.	26th.	31st.	Day of the Month.	5th.	10th.	15th.	20th.	25th.	30th.
Semidiameter . .	5.2	5.4	5.2	4.9	4.5	4.1	3.8	Semidiameter . .	3.5	3.2	3.0	2.8	2.7	2.6
Hor. Parallax . .	13.7	14.3	13.9	12.9	11.8	10.8	9.9	Hor. Parallax . .	9.2	8.5	8.0	7.6	7.2	6.9

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.



## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>
1	1 56 38.57	+18.403	+10 24 2.2	+122.73	23 20.7	1	6 11 46.76	+16.888	+25 34 10.6	- 9.43	1 30.3
2	2 4 4.40	18.752	11 13 14.1	123.22	23 24.3	2	6 18 23.82	16.958	25 29 30.7	13.00	1 33.0
3	2 11 38.71	19.106	12 2 34.4	123.49	23 28.1	3	6 24 47.04	15.675	25 23 10.3	17.05	1 35.5
4	2 19 21.59	19.466	12 51 55.5	123.20	23 32.0	4	6 30 56.14	15.081	25 15 16.1	21.02	1 37.7
5	2 27 13.08	19.825	13 41 9.5	122.80	23 36.1	5	6 36 50.83	14.475	25 5 54.8	25.11	1 39.6
6	2 35 13.14	+20.179	+14 30 6.7	+121.90	23 40.3	6	6 42 30.83	+13.857	+24 55 13.1	-25.33	1 41.3
7	2 43 21.62	20.535	15 18 37.2	120.57	23 44.9	7	6 47 55.90	13.288	24 43 17.5	31.37	1 42.8
8	2 51 38.24	20.858	16 6 30.2	118.77	23 49.1	8	6 53 5.75	12.580	24 30 14.5	33.94	1 44.0
9	3 0 2.65	21.173	16 53 34.2	116.48	23 53.7	9	6 58 0.14	11.939	24 16 10.6	36.35	1 45.0
10	3 8 34.33	21.469	17 39 37.1	113.68	23 58.4	10	7 2 38.76	11.276	24 1 12.0	38.50	1 45.6
11	3 17 12.61	+21.722	+18 24 26.5	+110.35		11	7 7 1.31	+10.001	+23 45 25.0	-40.38	1 46.0
12	3 25 56.69	21.944	19 7 49.9	108.51	0 3.2	12	7 11 7.52	9.914	23 28 55.9	42.00	1 46.2
13	3 34 45.61	22.125	19 49 35.1	102.17	0 8.1	13	7 14 57.08	9.214	23 11 50.8	43.28	1 46.0
14	3 43 34.34	22.260	20 29 30.2	97.34	0 13.0	14	7 18 29.68	8.500	22 54 15.8	44.50	1 45.6
15	3 52 33.68	22.343	21 7 24.1	92.07	0 18.0	15	7 21 44.99	7.773	22 36 17.0	45.36	1 44.9
16	4 1 30.40	+22.374	+21 43 6.5	+86.41	0 23.1	16	7 24 42.67	+ 7.022	+22 18 0.4	-45.96	1 43.9
17	4 10 27.19	22.349	22 16 29.0	80.41	0 28.1	17	7 27 22.40	6.277	21 59 32.1	46.34	1 42.6
18	4 19 22.71	22.268	22 47 24.2	74.14	0 33.1	18	7 29 43.88	5.510	21 40 58.2	46.45	1 41.0
19	4 28 15.64	22.133	23 15 46.3	67.68	0 38.0	19	7 31 46.78	4.730	21 22 24.7	46.31	1 39.1
20	4 37 4.68	21.945	23 41 31.7	61.00	0 42.9	20	7 33 30.81	3.938	21 3 57.5	45.92	1 36.9
21	4 45 48.62	+21.708	+24 4 38.1	+ 54.44	0 47.7	21	7 34 55.72	+ 3.137	+20 45 42.6	-45.28	1 34.3
22	4 54 26.29	21.424	24 25 4.7	47.78	0 52.4	22	7 36 1.31	2.328	20 27 46.0	44.30	1 31.4
23	5 2 56.62	21.097	24 42 52.1	41.19	0 57.0	23	7 36 47.43	1.515	20 10 13.7	43.26	1 28.2
24	5 11 18.62	20.730	24 58 2.6	34.71	1 1.4	24	7 37 14.04	+ 0.709	19 53 11.7	41.87	1 24.7
25	5 19 31.40	20.329	25 10 39.2	26.38	1 5.7	25	7 37 21.15	- 0.106	19 36 45.7	40.25	1 20.9
26	5 27 34.18	+19.898	+25 20 46.1	+ 22.23	1 9.8	26	7 37 8.93	- 0.206	+19 21 1.4	-38.40	1 16.8
27	5 35 26.26	19.438	25 28 28.1	16.31	1 13.8	27	7 36 37.67	1.093	19 6 4.4	36.31	1 12.3
28	5 43 7.02	18.954	25 33 50.7	10.69	1 17.5	28	7 35 47.86	2.454	18 52 0.1	34.01	1 7.5
29	5 50 35.90	18.449	25 36 59.9	5.19	1 21.0	29	7 34 40.14	3.183	18 38 53.5	31.50	1 2.5
30	5 57 52.43	17.925	25 38 1.9	+ 0.02	1 24.3	30	7 33 15.38	3.872	18 26 49.8	28.79	0 57.1
31	6 4 56.18	+17.384	+25 37 3.3	- 4.86	1 27.4	31	7 31 34.66	- 4.512	+18 15 53.0	-25.91	0 51.5
32	6 11 46.76	+16.828	+25 34 10.6	- 9.48	1 30.3	32	7 29 39.29	- 5.091	+18 6 7.4	-22.06	0 45.7
Day of the Month.						Day of the Month.					
Semidiameter ..						Semidiameter ..					
Hor. Parallax ..						Hor. Parallax ..					
5th.						4th.					
10th.						9th.					
15th.						14th.					
20th.						19th.					
25th.						24th.					
30th.						29th.					
2.5						3.5					
2.6						3.9					
2.7						4.3					
2.9						4.8					
2.9						5.2					
7.7						5.6					
7.1						12.6					
6.7						13.8					
6.8						14.9					
7.1											
7.7											

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s 7 31 34.66	s - 4.512	° ' " +18 15 53.0	" -25.91	h m 0 51.5	1	h m s 7 27 47.03	s +12.081	° ' " +20 45 21.5	+ 10.55	h m 22 47.1
2	7 29 39.29	5.091	18 6 7.4	22.86	0 45.7	2	7 33 12.32	14.090	20 48 42.8	6.15	22 48.9
3	7 27 30.87	5.599	17 57 36.6	19.68	0 39.6	3	7 38 59.65	14.916	20 50 12.9	+ 1.29	22 51.1
4	7 25 11.17	6.096	17 50 23.6	16.38	0 33.3	4	7 45 7.90	15.763	20 49 41.2	- 4.00	22 53.6
5	7 22 42.25	6.385	17 44 30.9	13.00	0 26.9	5	7 51 35.85	16.555	20 46 57.9	9.68	22 56.4
6	7 20 6.34	- 6.608	+17 40 0.2	- 9.55	0 20.4	6	7 58 22.02	+17.983	+20 41 54.1	- 15.70	22 59.5
7	7 17 25.88	6.746	17 36 52.6	6.03	0 13.8	7	8 5 24.89	17.943	20 34 22.2	22.00	23 2.9
8	7 14 43.41	6.774	17 35 8.4	- 2.61	0 7.2	8	8 12 42.70	18.598	20 24 16.3	26.53	23 6.5
9	7 12 1.61	6.690	17 34 47.1	+ 0.89	0 0.6	9	8 20 13.62	19.025	20 11 31.7	35.30	23 10.9
10	7 9 23.17	6.495	17 35 47.6	4.91	23 47.6	10	8 27 55.71	19.459	19 56 6.1	41.94	23 14.1
11	7 6 50.75	- 6.188	+17 38 8.2	+ 7.49	23 41.3	11	8 35 46.98	+19.799	+19 37 59.0	- 46.65	23 18.2
12	7 4 26.99	5.774	17 41 46.0	10.63	23 35.2	12	8 43 45.42	20.057	19 17 12.0	55.25	23 22.3
13	7 2 14.42	5.257	17 46 37.3	13.69	23 29.3	13	8 51 49.07	20.234	18 53 48.2	61.68	23 26.5
14	7 0 15.41	4.645	17 52 38.2	16.49	23 23.6	14	8 59 56.05	20.335	18 27 53.1	67.86	23 30.7
15	6 58 32.13	3.947	17 59 44.0	19.03	23 18.2	15	9 8 4.59	20.365	17 59 33.3	73.74	23 34.9
16	6 57 6.56	- 3.179	+18 7 49.0	+21.37	23 13.2	16	9 16 13.04	+20.330	+17 28 56.4	- 79.36	23 39.1
17	6 56 0.43	2.398	18 16 47.5	23.46	23 8.5	17	9 24 19.96	20.226	16 56 12.0	84.38	23 43.2
18	6 55 15.28	1.435	18 26 32.7	25.97	23 4.2	18	9 32 24.08	20.097	16 21 29.5	90.10	23 47.3
19	6 54 52.40	- 0.474	18 36 57.5	26.76	23 0.3	19	9 40 24.32	19.916	15 44 58.7	93.39	23 51.3
20	6 54 52.85	+ 0.516	18 47 54.3	27.23	22 56.7	20	9 48 19.77	19.700	15 6 50.1	97.26	23 55.2
21	6 55 17.48	+ 1.540	+18 59 15.2	+28.75	22 53.6	21	9 56 9.71	+19.458	+14 27 13.6	-100.71	23 59.0
22	6 56 6.97	2.587	19 10 51.5	29.21	22 50.9	22	10 3 53.58	19.198	13 46 19.1	103.77	
23	6 57 21.80	3.651	19 22 34.4	29.29	22 48.6	23	10 11 30.96	18.918	13 4 15.8	106.44	0 2.7
24	6 59 2.31	4.798	19 34 14.5	28.98	22 46.7	24	10 19 1.59	18.639	12 21 12.8	108.75	0 6.3
25	7 1 8.67	5.895	19 45 42.3	28.96	22 45.3	25	10 26 25.27	18.341	11 37 18.4	110.73	0 9.7
26	7 3 40.94	+ 6.884	+19 56 47.5	+27.11	22 44.3	26	10 33 41.95	+18.048	+10 52 40.4	-112.38	0 13.1
27	7 6 39.08	7.959	20 7 19.9	25.51	22 43.7	27	10 40 51.61	17.757	10 7 26.2	113.75	0 16.3
28	7 10 2.88	9.023	20 17 8.5	23.46	22 43.6	28	10 47 54.32	17.469	9 21 42.3	114.86	0 19.4
29	7 13 52.05	10.079	20 26 2.1	20.94	22 43.9	29	10 54 50.19	17.188	8 35 34.7	115.79	0 22.4
30	7 18 6.17	11.101	20 33 49.8	17.95	22 44.6	30	11 1 39.39	16.913	7 49 9.0	116.37	0 25.3
31	7 22 44.71	+12.108	+20 40 20.1	+14.49	22 45.7	31	11 8 22.08	+16.646	+ 7 2 30.4	-116.89	0 28.0
32	7 27 47.03	+13.081	+20 45 21.5	+10.55	22 47.1	32	11 14 58.48	+16.398	+ 6 15 43.3	-117.07	0 30.7

Day of the Month.	4th.	9th.	14th.	19th.	24th.	29th.	Day of the Month.	3d.	8th.	13th.	18th.	23d.	28th.
Semidiameter . .	5.9	6.8	6.5	6.0	4.4	3.8	Semidiameter . .	3.3	3.0	2.7	2.5	2.5	2.4
Hor. Parallax . .	15.5	15.4	14.6	13.2	11.6	10.1	Hor. Parallax . .	8.8	7.8	7.2	6.7	6.5	6.4

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	11 14 58.48	+16.336	+ 6 15 43.3	-117.07	0 30.7	1	13 59 34.81	+11.491	-14 32 16.5	-79.19	1 17.0
2	11 21 28.81	16.140	5 28 52.2	117.16	0 33.3	2	14 4 8.22	11.291	15 3 24.9	76.57	1 17.6
3	11 27 53.29	15.908	4 42 0.7	117.10	0 35.7	3	14 8 36.63	11.073	15 33 30.8	73.90	1 18.2
4	11 34 12.16	15.673	3 55 12.5	116.90	0 38.1	4	14 12 59.51	10.833	16 2 30.9	71.09	1 18.6
5	11 40 25.65	15.453	3 8 30.7	116.57	0 40.4	5	14 17 16.40	10.588	16 30 21.8	68.12	1 18.9
6	11 46 33.98	+15.243	+ 2 21 58.2	-116.19	0 42.6	6	14 21 26.58	+10.375	-16 56 59.6	-65.00	1 19.1
7	11 52 37.38	15.049	1 35 37.8	115.86	0 44.7	7	14 25 29.35	9.950	17 22 20.3	61.70	1 19.2
8	11 58 36.08	14.850	0 49 32.1	114.90	0 46.8	8	14 29 23.90	9.589	17 46 19.4	58.19	1 19.2
9	12 4 30.28	14.667	+ 0 3 43.4	114.14	0 48.7	9	14 33 9.98	9.186	18 8 51.7	54.46	1 19.0
10	12 10 20.17	14.492	- 0 41 46.1	113.31	0 50.6	10	14 36 44.44	8.737	18 29 51.6	50.49	1 18.6
11	12 16 5.96	+14.325	- 1 28 54.7	-112.40	0 52.4	11	14 40 8.22	+ 8.335	-18 49 13.1	-46.25	1 18.1
12	12 21 47.82	14.165	2 11 40.6	111.41	0 54.2	12	14 43 19.28	7.677	19 6 49.3	41.71	1 17.3
13	12 27 25.92	14.011	2 56 1.6	110.34	0 55.9	13	14 46 16.19	7.054	19 22 32.3	36.98	1 16.3
14	12 33 0.39	13.863	3 39 55.8	109.19	0 57.5	14	14 48 57.32	6.361	19 36 13.7	31.56	1 15.0
15	12 38 31.38	13.721	4 23 21.7	107.97	0 59.1	15	14 51 20.91	5.599	19 47 44.0	25.89	1 13.5
16	12 43 59.02	+13.583	- 5 6 17.7	-106.69	1 0.6	16	14 53 25.05	+ 4.739	-19 56 52.6	-19.74	1 11.6
17	12 49 23.41	13.450	5 48 42.3	105.35	1 2.1	17	14 55 7.69	3.900	20 3 27.5	13.08	1 9.4
18	12 54 44.64	13.320	6 30 33.9	103.94	1 3.5	18	14 56 26.70	2.799	20 7 16.3	- 5.88	1 6.7
19	13 0 2.77	13.199	7 11 50.9	102.47	1 4.8	19	14 57 19.85	1.645	20 8 5.0	+ 1.93	1 3.6
20	13 5 17.87	13.086	7 52 31.8	100.93	1 6.1	20	14 57 44.93	+ 0.430	20 5 38.6	10.36	1 0.1
21	13 10 29.96	+12.942	- 8 32 35.0	-99.33	1 7.4	21	14 57 39.82	- 0.899	-19 59 41.7	+ 19.48	0 56.1
22	13 15 39.06	12.817	9 11 59.1	97.66	1 8.6	22	14 57 2.64	2.940	19 49 58.6	29.29	0 51.5
23	13 20 45.17	12.691	9 50 42.2	95.92	1 9.7	23	14 55 51.87	2.064	19 36 14.7	29.54	0 46.4
24	13 25 48.23	12.563	10 28 42.7	94.11	1 10.8	24	14 54 6.69	5.110	19 18 17.2	50.39	0 40.7
25	13 30 48.18	12.439	11 5 59.0	92.23	1 11.9	25	14 51 46.70	6.541	18 55 57.2	61.39	0 34.4
26	13 35 44.92	+12.296	-11 42 29.1	-90.27	1 12.9	26	14 48 53.13	- 7.906	-18 29 11.3	+ 72.49	0 27.6
27	13 40 38.34	12.164	12 18 11.2	88.22	1 13.9	27	14 45 28.11	9.152	17 58 4.7	83.05	0 20.3
28	13 45 28.27	12.005	12 53 3.2	86.09	1 14.8	28	14 41 35.30	10.212	17 22 52.6	92.77	0 12.5
29	13 50 14.50	11.846	13 27 3.0	83.87	1 15.6	29	14 37 19.90	11.094	16 44 3.7	101.09	0 4.2
30	13 54 56.78	11.675	14 0 8.2	81.55	1 16.3	30	14 32 48.57	11.530	16 2 19.9	107.23	23 47.4
31	13 59 34.81	+11.491	-14 32 16.5	-79.19	1 17.0	31	14 28 9.20	-11.699	-15 18 36.9	+110.87	23 38.9
32	14 4 8.22	+11.291	-15 3 24.9	-76.57	1 17.6	32	14 23 30.44	-11.476	-14 34 1.7	+111.53	23 30.5
Day of the Month.						Day of the Month.					
2d.						2d.					
7th.						7th.					
12th.						12th.					
17th.						17th.					
22d.						22d.					
27th.						27th.					
Semidiameter . . .						Semidiameter . .					
Horizontal Parallax						Hor. Parallax . .					
2.4						3.0					
6.5						8.0					
2.5						3.3					
6.5						8.7					
2.5						3.6					
6.7						10.5					
2.6						4.0					
6.9						11.8					
2.7						4.4					
7.2						12.9					
2.8											
7.6											

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
	Noon.	Noon.	Noon.	Noon.	h m		Noon.	Noon.	Noon.	Noon.	h m			
1	14 23 30.44	-11.476	-14 34 1.7	+111.53	23 30.5	1	15 32 1.81	+15.067	-17 58 38.6	-71.40	23 50.9			
2	14 19 1.29	10.892	13 49 48.7	109.01	23 22.3	2	15 38 5.34	15.927	18 26 51.8	69.92	23 53.1			
3	14 14 50.37	9.992	13 7 14.3	103.34	23 14.8	3	15 44 12.59	15.376	18 54 33.6	68.98	23 55.4			
4	14 11 5.46	8.734	12 27 31.3	94.79	23 7.6	4	15 50 23.30	15.516	19 21 30.8	66.47	23 57.7			
5	14 7 53.02	7.999	11 51 43.6	83.88	23 1.0	5	15 56 37.28	15.648	19 47 43.2	64.54	23 0.0			
6	14 5 17.68	-5.637	-11 20 42.2	+71.05	22 55.1	6	16 2 54.36	+15.774	-20 13 7.5	-62.47	23 2.4			
7	14 3 23.22	3.909	10 55 2.5	57.19	22 50.0	7	16 9 14.39	15.894	20 37 40.6	60.92	23 4.8			
8	14 2 10.53	2.146	10 35 4.9	42.64	22 45.6	8	16 15 37.25	16.010	21 1 20.2	58.00	23 7.3			
9	14 1 39.96	-0.409	10 20 55.6	38.18	22 41.8	9	16 22 2.84	16.122	21 24 3.7	55.61	23 9.9			
10	14 1 50.39	+1.964	10 12 28.5	14.19	22 38.6	10	16 28 31.06	16.230	21 45 48.7	53.13	23 12.4			
11	14 2 39.86	+2.840	-10 9 28.4	+0.98	22 36.0	11	16 35 1.84	+16.335	-22 6 33.2	-50.57	23 15.0			
12	14 4 5.82	4.302	10 11 33.1	-11.18	22 34.0	12	16 41 35.10	16.436	22 26 15.3	47.92	23 17.7			
13	14 6 5.37	5.638	10 18 16.1	22.19	22 32.6	13	16 48 10.75	16.535	22 44 53.0	45.90	23 20.4			
14	14 8 35.45	6.846	10 29 8.7	31.99	22 31.6	14	16 54 48.75	16.632	23 2 24.5	42.41	23 23.1			
15	14 11 32.98	7.998	10 43 41.7	40.57	22 31.0	15	17 1 29.04	16.736	23 18 48.2	39.56	23 25.9			
16	14 14 55.03	+8.890	-11 1 26.5	-47.97	22 30.8	16	17 8 11.55	+16.817	-23 34 2.4	-36.88	23 28.7			
17	14 18 38.89	9.749	11 21 55.5	54.97	22 30.8	17	17 14 56.23	16.906	23 48 5.4	33.63	23 31.5			
18	14 22 41.82	10.492	11 44 43.3	59.55	22 31.2	18	17 21 43.01	16.993	24 0 56.0	30.68	23 34.4			
19	14 27 1.74	11.153	12 9 26.2	63.89	22 31.9	19	17 28 31.86	17.077	24 12 32.6	27.46	23 37.3			
20	14 31 36.52	11.733	12 35 43.2	67.40	22 32.7	20	17 35 22.69	17.168	24 22 53.7	24.98	23 40.3			
21	14 36 24.35	+12.943	-13 3 15.2	-70.15	22 33.7	21	17 42 15.43	+17.236	-24 31 57.8	-21.05	23 43.3			
22	14 41 23.68	12.692	13 31 45.1	72.94	22 34.9	22	17 49 10.00	17.311	24 39 43.7	17.76	23 46.3			
23	14 46 33.15	13.089	14 0 58.0	73.74	22 36.3	23	17 56 6.34	17.384	24 46 10.1	14.48	23 49.3			
24	14 51 51.57	13.439	14 30 40.4	74.79	22 37.8	24	18 3 4.38	17.459	24 51 15.6	11.02	23 52.3			
25	14 57 17.91	13.750	15 0 40.5	75.23	22 39.4	25	18 10 3.99	17.516	24 54 58.9	7.58	23 55.4			
26	15 2 51.32	+14.029	-15 30 48.3	-75.35	22 41.1	26	18 17 5.12	+17.577	-24 57 18.8	-4.08	23 58.5			
27	15 8 31.06	14.978	16 0 54.6	75.19	22 42.9	27	18 24 7.64	17.632	24 58 14.1	-0.52				
28	15 14 16.47	14.592	16 30 51.5	74.57	22 44.8	28	18 31 11.42	17.683	24 57 43.6	+3.08	0 1.7			
29	15 20 7.01	14.707	17 0 31.8	73.74	22 46.8	29	18 38 16.38	17.730	24 55 46.1	6.73	0 4.8			
30	15 26 2.25	14.894	17 29 49.3	72.68	22 48.8	30	18 45 22.40	17.771	24 52 20.6	10.42	0 8.0			
31	15 32 1.81	+15.067	-17 58 38.6	-71.40	22 50.9	31	18 52 29.34	+17.806	-24 47 26.0	+14.15	0 11.1			
32	15 38 5.34	+15.287	-18 26 54.8	-69.92	22 53.1	32	18 59 37.02	+17.834	-24 41 1.3	+17.92	0 14.3			
Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	31st.
Semidiameter	4.9	4.6	3.9	3.4	3.1	2.8	Semidiameter	2.6	2.5	2.4	2.3	2.3	2.3	2.3
Hor. Parallax	13.1	12.0	10.4	9.0	8.0	7.4	Hor. Parallax	6.8	6.6	6.3	6.2	6.1	6.1	6.2

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

GREENWICH MEAN TIME.														
JANUARY.						FEBRUARY.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.				
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m			
1	15 37 43.87	+11.695	-16 40 9.5	-42.44	20 56.1	1	18 11 31.41	+12.953	-21 55 44.1	- 4.38	21 28.1			
2	15 42 23.60	11.685	16 56 58.5	41.65	20 56.8	2	18 16 42.47	12.969	21 57 10.7	2.83	21 29.3			
3	15 47 4.77	11.745	17 13 28.2	40.83	20 57.5	3	18 21 53.89	12.982	21 57 59.9	- 1.37	21 30.6			
4	15 51 47.35	11.804	17 29 37.8	39.97	20 58.3	4	18 27 5.61	12.993	21 58 11.6	+ 0.30	21 31.8			
5	15 56 31.34	11.869	17 45 26.3	39.08	20 59.1	5	18 32 17.57	13.008	21 57 45.7	1.87	21 33.1			
6	16 1 16.72	+11.919	-18 0 53.0	-38.15	21 0.0	6	18 37 29.70	+13.008	-21 56 41.8	+ 3.45	21 34.3			
7	16 6 3.46	11.978	18 15 57.0	37.19	21 0.8	7	18 42 41.95	13.012	21 55 0.1	5.03	21 35.6			
8	16 10 51.56	12.039	18 30 37.6	36.19	21 1.7	8	18 47 54.26	13.014	21 52 40.5	6.61	21 36.9			
9	16 15 41.00	12.087	18 44 53.9	35.16	21 2.6	9	18 53 6.59	13.013	21 49 43.0	8.19	21 38.2			
10	16 20 31.73	12.141	18 58 45.2	34.10	21 3.5	10	18 58 18.86	13.010	21 46 7.4	9.77	21 39.5			
11	16 25 23.74	+12.194	-19 12 10.6	-33.01	21 4.4	11	19 3 31.03	+13.004	-21 41 53.9	+11.35	21 40.7			
12	16 30 17.00	12.245	19 25 9.5	31.89	21 5.4	12	19 8 43.03	12.996	21 37 2.5	12.93	21 41.9			
13	16 35 11.48	12.295	19 37 41.2	30.74	21 6.4	13	19 13 54.82	12.986	21 31 33.3	14.50	21 43.2			
14	16 40 7.15	12.344	19 49 44.9	29.56	21 7.4	14	19 19 6.34	12.973	21 25 26.5	16.07	21 44.5			
15	16 45 3.97	12.391	20 1 19.9	28.35	21 8.4	15	19 24 17.52	12.959	21 18 42.2	17.63	21 45.7			
16	16 50 1.91	+12.437	-20 12 25.5	-27.11	21 9.5	16	19 29 28.35	+12.948	-21 11 20.5	+19.18	21 46.9			
17	16 55 0.95	12.482	20 23 1.1	25.85	21 10.5	17	19 34 38.76	12.934	21 3 21.8	20.72	21 48.1			
18	17 0 1.03	12.525	20 33 6.0	24.56	21 11.6	18	19 39 48.70	12.904	20 54 46.1	22.25	21 49.3			
19	17 5 2.14	12.567	20 42 39.7	23.25	21 12.7	19	19 44 58.14	12.882	20 45 33.8	23.77	21 50.5			
20	17 10 4.24	12.607	20 51 41.6	21.91	21 13.8	20	19 50 7.03	12.858	20 35 45.2	25.28	21 51.7			
21	17 15 7.28	+12.646	-21 0 11.1	-20.55	21 14.9	21	19 55 15.34	+12.833	-20 25 20.6	+26.77	21 52.9			
22	17 20 11.23	12.683	21 8 7.7	19.17	21 16.1	22	20 0 23.03	12.806	20 14 20.3	28.25	21 54.1			
23	17 25 16.05	12.718	21 15 30.9	17.76	21 17.2	23	20 5 30.07	12.778	20 2 44.7	29.71	21 55.3			
24	17 30 21.70	12.759	21 22 20.2	16.34	21 18.4	24	20 10 36.41	12.740	19 50 34.2	31.16	21 56.5			
25	17 35 28.13	12.784	21 28 35.1	14.90	21 19.6	25	20 15 42.03	12.719	19 37 49.1	32.59	21 57.6			
26	17 40 35.30	+12.814	-21 34 15.3	-13.44	21 20.8	26	20 20 46.91	+12.688	-19 24 29.9	+34.00	21 58.7			
27	17 45 43.18	12.842	21 39 20.2	11.97	21 22.0	27	20 25 51.03	12.655	19 10 37.0	35.40	21 59.8			
28	17 50 51.71	12.868	21 43 49.6	10.48	21 23.2	28	20 30 54.34	12.621	18 56 10.8	36.78	22 0.9			
29	17 56 0.85	12.892	21 47 42.9	8.97	21 24.4	29	20 35 56.83	12.586	18 41 11.9	38.14	22 2.0			
30	18 1 10.54	12.915	21 51 0.0	7.45	21 25.6	30	20 40 58.49	12.551	18 25 40.7	39.47	22 3.1			
31	18 6 20.74	+12.935	-21 53 40.5	- 5.99	21 26.8	31	20 45 59.29	+12.515	-18 9 37.8	+40.78	22 4.1			
32	18 11 31.41	+12.953	-21 55 44.1	- 4.38	21 28.1	32	20 50 59.22	+12.478	-17 53 3.6	+42.07	22 5.2			
Day of the Month.						Day of the Month.								
	1st.	6th.	11th.	16th.	21st.	26th.	31st.		5th.	10th.	15th.	20th.	25th.	30th.
Semidiameter . .	9.4	9.1	8.7	8.4	8.2	7.9	7.7	Semidiameter . .	7.4	7.2	7.0	6.9	6.7	6.6
Hor. Parallax . .	9.8	9.4	9.0	8.7	8.4	8.2	7.9	Hor. Parallax . .	7.7	7.5	7.3	7.1	6.9	6.8

NOTE.—The sign + indicates north declinations: the sign — indicates south declinations.

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

MARCH.						APRIL.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.					
h m s	s	o ' "	"	h m		h m s	s	o ' "	"	h m				
1 20 40 58.49	+12.551	-18 25 40.7	+39.47	22 3.1	1	23 9 21.15	+11.451	-6 52 23.4	+67.97	22 28.8				
2 20 45 59.29	12.515	18 9 37.8	40.78	22 4.1	2	23 13 55.70	11.438	6 25 6.4	68.44	22 29.4				
3 20 50 59.22	12.478	17 53 3.6	42.07	22 5.2	3	23 18 29.73	11.407	5 57 38.4	68.89	22 30.1				
4 20 55 58.26	12.441	17 35 58.8	43.34	22 6.2	4	23 23 3.27	11.387	5 30 0.1	69.30	22 30.7				
5 21 0 56.38	12.403	17 18 23.8	44.58	22 7.2	5	23 27 36.35	11.369	5 2 12.1	69.69	22 31.3				
6 21 5 53.58	+12.364	-17 0 19.2	+45.80	22 8.2	6	23 32 9.01	+11.352	-4 34 15.1	+70.05	22 31.9				
7 21 10 49.85	12.325	16 41 45.7	46.99	22 9.2	7	23 36 41.27	11.336	4 6 10.0	70.38	22 32.5				
8 21 15 45.18	12.286	16 22 43.8	48.16	22 10.2	8	23 41 13.16	11.322	3 37 57.3	70.68	22 33.1				
9 21 20 39.56	12.246	16 3 14.2	49.30	22 11.2	9	23 45 44.73	11.309	3 9 37.8	70.95	22 33.7				
10 21 25 32.98	12.206	15 43 17.4	50.42	22 12.1	10	23 50 16.00	11.297	2 41 12.2	71.19	22 34.3				
11 21 30 25.44	+12.166	-15 22 54.2	+51.51	22 13.0	11	23 54 47.01	+11.287	-2 12 41.1	+71.40	22 34.8				
12 21 35 16.94	12.126	15 2 5.2	52.57	22 13.9	12	23 59 17.80	11.278	1 44 5.3	71.58	22 35.4				
13 21 40 7.47	12.086	14 40 50.9	53.61	22 14.8	13	0 3 48.39	11.271	1 15 25.5	71.74	22 35.9				
14 21 44 57.04	12.046	14 19 12.1	54.62	22 15.6	14	0 8 18.83	11.265	0 46 42.3	71.86	22 36.5				
15 21 49 45.66	12.006	13 57 9.4	55.60	22 16.5	15	0 12 49.15	11.261	-0 17 56.4	71.96	22 37.1				
16 21 54 33.33	+11.967	-13 34 43.4	+56.56	22 17.3	16	0 17 19.38	+11.259	+0 10 51.4	+72.02	22 37.7				
17 21 59 20.07	11.928	13 11 54.9	57.48	22 18.1	17	0 21 49.57	11.258	0 39 40.5	72.06	22 38.2				
18 22 4 5.88	11.889	12 48 44.6	58.38	22 18.9	18	0 26 19.75	11.250	1 8 30.1	72.07	22 38.8				
19 22 8 50.78	11.851	12 25 13.1	59.25	22 19.7	19	0 30 49.97	11.261	1 37 19.6	72.05	22 39.3				
20 22 13 34.78	11.814	12 1 21.1	60.09	22 20.5	20	0 35 20.27	11.265	2 6 8.4	72.00	22 39.9				
21 22 18 17.90	+11.778	-11 37 9.3	+60.90	22 21.3	21	0 39 50.68	+11.270	+2 34 55.7	+71.93	22 40.4				
22 22 23 0.17	11.743	11 12 38.3	61.68	22 22.0	22	0 44 21.24	11.277	3 3 40.8	71.82	22 41.0				
23 22 27 41.60	11.709	10 47 48.8	62.43	22 22.8	23	0 48 52.00	11.286	3 32 23.1	71.69	22 41.6				
24 22 32 22.23	11.676	10 22 41.5	63.16	22 23.5	24	0 53 22.99	11.297	4 1 1.9	71.53	22 42.2				
25 22 37 2.06	11.644	9 57 17.1	63.86	22 24.2	25	0 57 54.26	11.309	4 29 36.5	71.34	22 42.7				
26 22 41 41.13	+11.613	- 9 31 36.2	+64.53	22 24.9	26	1 2 25.85	+11.323	+4 58 6.3	+71.12	22 43.3				
27 22 46 19.46	11.583	9 5 39.6	65.17	22 25.6	27	1 6 57.79	11.339	5 26 30.5	70.88	22 43.9				
28 22 50 57.09	11.554	8 39 27.9	65.79	22 26.3	28	1 11 30.13	11.357	5 54 48.5	70.61	22 44.5				
29 22 55 34.04	11.526	8 13 1.7	66.38	22 27.0	29	1 16 2.91	11.376	6 22 59.5	70.31	22 45.1				
30 23 0 10.35	11.500	7 46 21.7	66.94	22 27.6	30	1 20 36.16	11.397	6 51 3.0	69.98	22 45.7				
31 23 4 46.04	+11.475	- 7 19 28.7	+67.47	22 28.2	31	1 25 9.92	+11.418	+7 18 58.2	+69.62	22 46.4				
32 23 9 21.15	+11.451	- 6 52 23.4	+67.97	22 28.8	32	1 29 44.23	+11.441	+7 46 44.4	+69.33	22 47.0				
Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	31st.	Day of the Month.	5th.	10th.	15th.	20th.	25th.	30th.
Semidiameter . .	6.6	6.4	6.3	6.2	6.0	5.9	5.8	Semidiameter . .	5.7	5.7	5.6	5.5	5.4	5.4
Hor. Parallax . .	6.8	6.6	6.5	6.4	6.3	6.1	6.0	Hor. Parallax . .	5.9	5.9	5.8	5.7	5.6	5.5

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			h m s	s	° ' "	"	
1	1 25 9.92	+11.418	+ 7 18 58.2	+69.69	22 46.4	1	3 53 26.77	+19.698	+19 30 39.9	+43.63	23 12.9
2	1 29 44.23	11.441	7 46 44.4	69.23	22 47.0	2	3 58 30.40	12.674	19 47 51.3	43.33	23 14.1
3	1 34 19.11	11.466	8 14 20.8	68.81	22 47.7	3	4 3 35.13	12.790	20 4 31.0	41.00	23 15.2
4	1 38 54.61	11.492	8 41 46.9	68.36	22 48.3	4	4 8 40.96	12.765	20 20 38.5	39.64	23 16.4
5	1 43 30.77	11.520	9 9 1.8	67.88	22 49.0	5	4 13 47.86	12.810	20 36 13.0	38.25	23 17.6
6	1 48 7.60	+11.549	+ 9 36 4.9	+67.38	22 49.7	6	4 18 55.81	+12.853	+20 51 13.9	+36.84	23 18.8
7	1 52 45.15	11.580	10 2 55.5	66.84	22 50.4	7	4 24 4.80	12.896	21 5 40.7	35.41	23 20.0
8	1 57 23.44	11.611	10 29 32.8	66.37	22 51.1	8	4 29 14.79	12.938	21 19 32.7	33.95	23 21.2
9	2 2 2.50	11.644	10 55 56.1	65.67	22 51.8	9	4 34 25.77	12.978	21 32 49.4	32.47	23 22.4
10	2 6 42.37	11.678	11 22 4.6	65.04	22 52.5	10	4 39 37.70	13.017	21 45 30.2	30.96	23 23.7
11	2 11 23.06	+11.713	+11 47 57.7	+64.38	22 53.3	11	4 44 50.56	+13.055	+21 57 34.6	+29.43	23 25.0
12	2 16 4.61	11.749	12 13 34.6	63.69	22 54.0	12	4 50 4.31	13.091	22 9 2.0	27.87	23 26.3
13	2 20 47.04	11.787	12 38 54.6	62.97	22 54.8	13	4 55 18.90	13.125	22 19 51.9	26.29	23 27.6
14	2 25 30.37	11.825	13 3 56.9	62.22	22 55.6	14	5 0 34.30	13.158	22 30 3.9	24.70	23 29.0
15	2 30 14.63	11.865	13 28 40.8	61.44	22 56.4	15	5 5 50.48	13.189	22 39 37.4	23.09	23 30.3
16	2 34 59.84	+11.905	+13 53 5.6	+60.62	22 57.2	16	5 11 7.39	+13.219	+22 48 32.0	+21.46	23 31.7
17	2 39 46.02	11.946	14 17 10.6	59.78	22 58.1	17	5 16 24.98	13.247	22 56 47.4	19.82	23 33.0
18	2 44 33.21	11.988	14 40 55.0	58.91	22 58.9	18	5 21 43.22	13.273	23 4 23.2	18.16	23 34.4
19	2 49 21.41	12.030	15 4 18.2	58.01	22 59.8	19	5 27 2.06	13.297	23 11 19.0	16.49	23 35.8
20	2 54 10.65	12.073	15 27 19.3	57.08	23 0.7	20	5 32 21.45	13.319	23 17 34.4	14.80	23 37.2
21	2 59 0.93	+12.117	+15 49 57.7	+56.19	23 1.6	21	5 37 41.35	+13.339	+23 23 9.1	+13.09	23 38.6
22	3 3 52.28	12.162	16 12 12.7	55.13	23 2.5	22	5 43 1.70	13.357	23 28 2.9	11.38	23 40.0
23	3 8 44.71	12.207	16 34 3.5	54.11	23 3.5	23	5 48 22.45	13.373	23 32 15.5	9.66	23 41.4
24	3 13 38.23	12.253	16 55 29.5	53.06	23 4.5	24	5 53 43.55	13.386	23 35 46.6	7.93	23 42.8
25	3 18 32.85	12.299	17 16 29.9	51.98	23 5.5	25	5 59 4.95	13.397	23 38 36.1	6.19	23 44.2
26	3 23 28.60	+12.346	+17 37 4.1	+50.87	23 6.5	26	6 4 26.60	+13.406	+23 40 43.9	+ 4.45	23 45.6
27	3 28 25.47	12.393	17 57 11.4	49.73	23 7.5	27	6 9 48.44	13.413	23 42 9.8	2.70	23 47.0
28	3 33 23.47	12.440	18 16 51.1	48.58	23 8.5	28	6 15 10.41	13.417	23 42 53.7	+ 0.25	23 48.5
29	3 38 22.60	12.487	18 36 2.4	47.37	23 9.6	29	6 20 32.46	13.419	23 42 55.5	- 0.80	23 49.9
30	3 43 22.86	12.534	18 54 44.8	46.15	23 10.7	30	6 25 54.53	13.419	23 42 15.2	2.56	23 51.3
31	3 48 24.25	+12.581	+19 12 57.5	+44.90	23 11.8	31	6 31 16.57	+13.417	+23 40 52.6	- 4.31	23 52.7
32	3 53 26.77	+12.628	+19 30 39.9	+43.63	23 12.9	32	6 36 38.52	+13.412	+23 38 47.9	- 6.07	23 54.2
Day of the Month.						Day of the Month.					
5th.						4th.					
10th.						9th.					
15th.						14th.					
20th.						19th.					
25th.						24th.					
30th.						29th.					
Semidiameter . .	5.3	5.2	5.2	5.1	5.1	Semidiameter . .	5.0	5.0	5.0	5.0	4.9
Hor. Parallax . .	5.5	5.4	5.4	5.3	5.3	Hor. Parallax . .	5.2	5.2	5.2	5.1	5.1

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>
1	6 31 16.57	+13.417	+23 40 52.6	- 4.31	23 52.7	1	9 12 46.52	+12.401	+17 30 10.9	-59.58	0 30.8
2	6 36 38.52	13.412	23 38 47.9	6.07	23 54.2	2	9 17 43.58	12.354	17 8 54.5	53.78	0 31.8
3	6 42 0.31	13.405	23 36 1.1	7.83	23 55.6	3	9 22 39.51	12.307	16 47 9.7	54.95	0 32.8
4	6 47 21.90	13.395	23 32 32.2	9.58	23 57.0	4	9 27 34.31	12.260	16 24 57.2	56.09	0 33.8
5	6 52 43.22	13.383	23 28 21.3	11.33	23 58.4	5	9 32 27.99	12.213	16 2 17.6	57.21	0 34.8
6	6 58 4.23	+13.368	+23 23 28.7	-13.07	23 59.9	6	9 37 20.55	+12.167	+15 39 11.5	-58.29	0 35.7
7	7 3 24.84	13.351	23 17 54.4	14.80		7	9 42 11.99	12.121	15 15 39.8	59.35	0 36.6
8	7 8 45.02	13.332	23 11 38.7	16.52	0 1.3	8	9 47 2.33	12.075	14 51 43.1	60.37	0 37.5
9	7 14 4.71	13.310	23 4 41.8	18.23	0 2.7	9	9 51 51.59	12.030	14 27 22.2	61.37	0 38.4
10	7 19 23.85	13.286	22 57 3.9	19.93	0 4.1	10	9 56 39.78	11.985	14 2 37.9	62.33	0 39.2
11	7 24 42.40	+13.259	+22 48 45.3	-21.62	0 5.4	11	10 1 26.90	+11.941	+13 37 30.8	-63.26	0 40.0
12	7 30 0.30	13.231	22 39 46.3	23.29	0 6.8	12	10 6 12.98	11.896	13 12 1.7	64.16	0 40.8
13	7 35 17.50	13.201	22 30 7.3	24.95	0 8.1	13	10 10 58.04	11.856	12 46 11.3	65.03	0 41.6
14	7 40 33.96	13.170	22 19 48.7	26.60	0 9.4	14	10 15 42.10	11.815	12 20 0.3	65.87	0 42.4
15	7 45 49.63	13.137	22 8 50.7	28.23	0 10.7	15	10 20 25.18	11.775	11 53 29.5	66.68	0 43.2
16	7 51 4.49	+13.101	+21 57 13.9	-29.84	0 12.0	16	10 25 7.31	+11.736	+11 26 39.6	-67.46	0 43.9
17	7 56 18.48	13.064	21 44 58.6	31.44	0 13.2	17	10 29 48.52	11.696	10 59 31.4	68.21	0 44.7
18	8 1 31.56	13.026	21 32 5.3	33.01	0 14.5	18	10 34 28.84	11.661	10 32 5.6	68.93	0 45.4
19	8 6 43.71	12.986	21 18 34.5	34.56	0 15.7	19	10 39 8.29	11.626	10 4 22.9	69.62	0 46.1
20	8 11 54.90	12.945	21 4 26.7	36.09	0 17.0	20	10 43 46.91	11.582	9 36 24.1	70.28	0 46.8
21	8 17 5.10	+12.903	+20 49 42.4	-37.60	0 18.2	21	10 48 24.73	+11.560	+ 9 8 9.8	-70.91	0 47.5
22	8 22 14.29	12.860	20 34 22.2	39.08	0 19.5	22	10 53 1.78	11.529	8 39 40.8	71.51	0 48.3
23	8 27 22.44	12.817	20 18 26.6	40.54	0 20.7	23	10 57 38.11	11.499	8 10 57.8	72.08	0 49.0
24	8 32 29.52	12.773	20 1 56.2	41.98	0 21.9	24	11 2 13.74	11.471	7 42 1.6	72.62	0 49.7
25	8 37 35.52	12.728	19 44 51.5	43.40	0 23.2	25	11 6 48.72	11.444	7 12 52.9	73.12	0 50.3
26	8 42 40.44	+12.682	+19 27 13.1	-44.79	0 24.3	26	11 11 23.08	+11.419	+ 6 43 32.3	-73.60	0 50.9
27	8 47 44.25	12.636	19 9 1.7	46.15	0 25.4	27	11 15 56.87	11.396	6 14 0.7	74.04	0 51.5
28	8 52 46.96	12.589	18 50 17.9	47.49	0 26.5	28	11 20 30.12	11.375	5 44 18.6	74.46	0 52.1
29	8 57 48.55	12.542	18 31 2.2	48.80	0 27.6	29	11 25 2.88	11.355	5 14 26.8	74.84	0 52.7
30	9 2 49.01	12.495	18 11 15.4	50.09	0 28.7	30	11 29 35.17	11.337	4 44 26.1	75.20	0 53.3
31	9 7 48.33	+12.448	+17 50 58.1	-51.35	0 29.7	31	11 34 7.04	+11.390	+ 4 14 17.2	-75.53	0 53.9
32	9 12 46.52	+12.401	+17 30 10.9	-52.58	0 30.8	32	11 38 38.54	+11.305	+ 3 44 0.7	-75.83	0 54.4

Day of the Month.	4th.	9th.	14th.	19th.	24th.	29th.	Day of the Month.	3d.	8th.	13th.	18th.	23d.	28th.
Semidiameter ..	4.9	4.9	4.9	4.9	5.0	5.0	Semidiameter ..	5.0	5.0	5.0	5.1	5.1	5.1
Hor. Parallax ..	5.1	5.1	5.1	5.1	5.1	5.1	Hor. Parallax ..	5.2	5.2	5.2	5.2	5.3	5.3

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.



## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s 11 38 38.54	s +11.305	° ' " + 3 44 0.7	" -75.83	h m 0 54.4	1	h m s 13 54 50.42	s +11.655	° ' " -11 21 52.5	" -70.54	h m 1 12.3
2	11 43 9.70	11.292	3 13 37.4	76.10	0 55.0	2	13 59 30.60	11.693	11 49 57.6	69.88	1 13.0
3	11 47 40.56	11.280	2 43 8.0	76.34	0 55.5	3	14 4 11.69	11.732	12 17 46.5	69.19	1 13.8
4	11 52 11.16	11.270	2 12 33.4	76.55	0 56.1	4	14 8 53.73	11.772	12 45 18.4	68.47	1 14.5
5	11 56 41.54	11.262	1 41 54.1	76.73	0 56.6	5	14 13 36.74	11.813	13 12 32.5	67.71	1 15.3
6	12 1 11.75	+11.255	+ 1 11 10.9	-76.87	0 57.2	6	14 18 20.76	+11.855	-13 39 28.0	-66.92	1 16.1
7	12 5 41.82	11.250	0 40 24.6	76.99	0 57.8	7	14 23 5.81	11.899	14 6 4.2	66.10	1 16.9
8	12 10 11.78	11.247	+ 0 9 36.0	77.07	0 58.4	8	14 27 51.92	11.943	14 32 20.2	65.35	1 17.7
9	12 14 41.68	11.246	- 0 21 14.3	77.13	0 58.9	9	14 32 39.10	11.988	14 58 15.3	64.35	1 18.6
10	12 19 11.58	11.246	0 52 5.6	77.15	0 59.5	10	14 37 27.38	12.034	15 23 48.6	63.43	1 19.4
11	12 23 41.50	+11.248	- 1 22 57.1	-77.14	1 0.0	11	14 42 16.77	+12.081	-15 48 59.4	-62.47	1 20.3
12	12 28 11.49	11.252	1 53 48.1	77.10	1 0.6	12	14 47 7.29	12.128	16 13 46.8	61.48	1 21.2
13	12 32 41.59	11.258	2 24 37.8	77.03	1 1.1	13	14 51 58.97	12.177	16 38 10.1	60.46	1 22.1
14	12 37 11.83	11.265	2 55 25.4	76.93	1 1.7	14	14 56 51.81	12.226	17 2 8.4	59.40	1 23.0
15	12 41 42.27	11.274	3 26 10.2	76.80	1 2.2	15	15 1 45.83	12.276	17 25 40.9	58.31	1 24.0
16	12 46 12.95	+11.284	- 3 56 51.6	-76.64	1 2.8	16	15 6 41.04	+12.326	-17 48 47.0	-57.19	1 25.0
17	12 50 43.90	11.296	4 27 28.7	76.45	1 3.4	17	15 11 37.45	12.376	18 11 25.7	56.04	1 26.0
18	12 55 15.17	11.310	4 58 0.9	76.23	1 4.0	18	15 16 35.08	12.427	18 33 36.4	54.85	1 27.0
19	12 59 46.81	11.326	5 28 27.4	75.98	1 4.5	19	15 21 33.93	12.478	18 55 18.2	53.63	1 28.1
20	13 4 18.85	11.344	5 58 47.4	75.69	1 5.1	20	15 26 33.99	12.530	19 16 30.5	52.38	1 29.1
21	13 8 51.35	+11.364	- 6 29 0.3	-75.38	1 5.7	21	15 31 35.26	+12.580	-19 37 12.5	-51.10	1 30.2
22	13 13 24.35	11.386	6 59 5.3	75.03	1 6.3	22	15 36 37.76	12.630	19 57 23.3	49.79	1 31.3
23	13 17 57.88	11.409	7 29 1.6	74.66	1 6.9	23	15 41 41.49	12.681	20 17 2.3	48.45	1 32.4
24	13 22 32.00	11.434	7 58 48.6	74.25	1 7.5	24	15 46 46.43	12.731	20 36 8.7	47.08	1 33.5
25	13 27 6.73	11.461	8 28 25.5	73.82	1 8.2	25	15 51 52.57	12.781	20 54 41.9	45.68	1 34.7
26	13 31 42.12	+11.489	- 8 57 51.5	-73.35	1 8.8	26	15 56 59.91	+12.831	-21 12 41.1	-44.25	1 35.9
27	13 36 18.22	11.519	9 27 5.9	72.85	1 9.5	27	16 2 8.43	12.880	21 30 5.6	42.79	1 37.1
28	13 40 55.07	11.551	9 56 8.0	72.32	1 10.2	28	16 7 18.11	12.938	21 46 54.8	41.30	1 38.3
29	13 45 32.69	11.584	10 24 57.0	71.76	1 10.9	29	16 12 28.94	12.975	22 3 8.0	39.78	1 39.6
30	13 50 11.13	11.619	10 53 32.1	71.16	1 11.6	30	16 17 40.89	13.021	22 18 44.5	38.24	1 40.8
31	13 54 50.42	+11.655	-11 21 52.5	-70.54	1 12.3	31	16 22 53.94	+13.068	-22 33 43.6	-36.67	1 42.1
32	13 59 30.60	+11.693	-11 49 57.6	-69.88	1 13.0	32	16 28 8.04	+13.109	-22 48 4.8	-35.08	1 43.4
Day of the Month.						Day of the Month.					
2d.						2d.					
7th.						7th.					
12th.						12th.					
17th.						17th.					
22d.						22d.					
27th.						27th.					
Semidiameter . . .						Semidiameter . .					
Horizontal Parallax						Hor. Parallax . .					
5.2						5.5					
5.4						5.7					
5.2						5.6					
5.3						5.7					
5.5						5.8					
5.3						5.9					
5.5						6.0					
5.4						6.1					
5.6						6.2					
5.5											
5.6											

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	16 28 8.04	+13.109	-22 48 4.8	-35.06	1 43.4	1	19 9 4.09	+13.317	-24 29 33.6	+19.18	2 26.1
2	16 33 23.17	13.151	23 1 47.4	33.46	1 44.7	2	19 14 23.27	13.261	24 21 31.6	20.98	2 27.5
3	16 38 39.28	13.191	23 14 50.8	31.89	1 46.0	3	19 19 41.56	13.243	24 12 46.7	22.76	2 28.9
4	16 43 56.34	13.230	23 27 14.5	30.15	1 47.4	4	19 24 58.92	13.203	24 3 19.2	24.53	2 30.2
5	16 49 14.31	13.267	23 38 57.9	28.46	1 48.7	5	19 30 15.29	13.160	23 53 9.5	26.29	2 31.5
6	16 54 33.14	+13.302	-23 50 0.5	-26.75	1 50.1	6	19 35 30.60	+13.115	-23 42 18.2	+28.01	2 32.8
7	16 59 52.77	13.334	24 0 21.7	25.02	1 51.4	7	19 40 44.80	13.068	23 30 45.7	29.71	2 34.1
8	17 5 13.14	13.364	24 10 1.2	23.27	1 52.9	8	19 45 57.84	13.019	23 18 32.6	31.39	2 35.4
9	17 10 34.20	13.391	24 18 58.5	21.50	1 54.3	9	19 51 9.66	12.967	23 5 39.4	33.05	2 36.7
10	17 15 55.89	13.416	24 27 13.0	19.71	1 55.7	10	19 56 20.22	12.913	22 52 6.5	34.69	2 37.9
11	17 21 18.15	+13.439	-24 34 44.4	-17.91	1 57.1	11	20 1 29.48	+12.858	-22 37 54.7	+36.30	2 39.1
12	17 26 40.94	13.459	24 41 32.4	16.09	1 58.6	12	20 6 37.38	12.801	22 23 4.4	37.89	2 40.3
13	17 32 4.19	13.477	24 47 36.7	14.26	2 0.0	13	20 11 43.90	12.742	22 7 36.3	39.45	2 41.5
14	17 37 27.82	13.492	24 52 57.0	12.42	2 1.5	14	20 16 48.98	12.682	21 51 31.2	40.99	2 42.6
15	17 42 51.78	13.504	24 57 33.0	10.57	2 3.0	15	20 21 52.61	12.621	21 34 49.6	42.49	2 43.7
16	17 48 15.99	+13.513	-25 1 24.5	-8.71	2 4.5	16	20 26 54.76	+12.558	-21 17 32.3	+43.97	2 44.8
17	17 53 40.39	13.520	25 4 31.3	6.85	2 5.9	17	20 31 55.40	12.495	20 59 39.9	45.41	2 45.9
18	17 59 4.90	13.523	25 6 53.2	4.98	2 7.4	18	20 36 54.51	12.430	20 41 13.0	46.83	2 46.9
19	18 4 29.47	13.524	25 8 30.2	3.11	2 8.8	19	20 41 52.07	12.366	20 22 12.5	48.21	2 47.9
20	18 9 54.03	13.522	25 9 22.2	-1.23	2 10.3	20	20 46 48.06	12.300	20 2 39.0	49.57	2 48.9
21	18 15 18.51	+13.517	-25 9 29.1	+0.65	2 11.7	21	20 51 42.48	+12.234	-19 42 33.3	+50.89	2 49.9
22	18 20 42.84	13.509	25 8 51.0	2.53	2 13.2	22	20 56 35.31	12.168	19 21 56.2	52.19	2 50.8
23	18 26 6.96	13.499	25 7 27.8	4.41	2 14.6	23	21 1 26.54	12.101	19 0 48.4	53.45	2 51.7
24	18 31 30.79	13.486	25 5 19.5	6.28	2 16.1	24	21 6 16.17	12.035	18 39 10.7	54.69	2 52.6
25	18 36 54.27	13.470	25 2 26.2	8.15	2 17.5	25	21 11 4.20	11.968	18 17 3.8	55.89	2 53.5
26	18 42 17.34	+13.451	-24 58 48.2	+10.01	2 19.0	26	21 15 50.63	+11.901	-17 54 28.4	+57.06	2 54.3
27	18 47 39.93	13.430	24 54 25.6	11.87	2 20.4	27	21 20 35.45	11.834	17 31 25.3	58.20	2 55.1
28	18 53 1.96	13.406	24 49 18.6	13.72	2 21.9	28	21 25 18.66	11.767	17 7 55.3	59.30	2 55.9
29	18 58 23.37	13.379	24 43 27.5	15.55	2 23.3	29	21 30 0.27	11.701	16 43 59.2	60.37	2 56.6
30	19 3 44.10	13.349	24 36 52.4	17.37	2 24.7	30	21 34 40.29	11.634	16 19 37.9	61.41	2 57.3
31	19 9 4.09	+13.317	-24 29 33.6	+19.18	2 26.1	31	21 39 18.72	+11.568	-15 54 52.1	+62.41	2 58.0
32	19 14 23.27	+13.261	-24 21 31.6	+20.98	2 27.5	32	21 43 55.56	+11.509	-15 29 42.6	+63.38	2 58.7

Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	31st.
Semidiameter . .	6".1	6".2	6".3	6".4	6".6	6".7	Semidiameter . .	6".9	7".1	7".3	7".5	7".7	7".9	8".1
Hor. Parallax . .	6.3	6.4	6.6	6.7	6.8	7.0	Hor. Parallax . .	7.1	7.3	7.5	7.7	7.9	8.2	8.4

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

GREENWICH MEAN TIME.														
JANUARY.						FEBRUARY.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.				
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m			
1	12 50 44.39	+4.236	-3 8 42.9	-25.12	18 6.7	1	13 35 51.78	+2.881	-7 22 52.8	-15.12	16 49.3			
2	12 52 25.71	4.906	3 18 42.9	24.87	18 4.5	2	13 37 0.18	2.818	7 28 50.9	14.72	16 46.5			
3	12 54 6.30	4.176	3 28 36.8	24.69	18 2.2	3	13 38 7.05	2.754	7 34 39.2	14.31	16 43.7			
4	12 55 46.15	4.144	3 38 24.5	24.36	17 59.9	4	13 39 12.35	2.688	7 40 17.7	13.89	16 40.9			
5	12 57 25.23	4.112	3 48 6.0	24.09	17 57.6	5	13 40 16.05	2.620	7 45 46.2	13.48	16 38.0			
6	12 59 3.53	+4.079	-3 57 41.1	-23.82	17 55.3	6	13 41 18.11	+2.550	-7 51 4.6	-13.05	16 35.0			
7	13 0 41.03	4.045	4 7 9.6	23.55	17 53.0	7	13 42 18.47	2.479	7 56 12.7	12.61	16 32.1			
8	13 2 17.71	4.011	4 16 31.4	23.27	17 50.6	8	13 43 17.10	2.406	8 1 10.4	12.18	16 29.1			
9	13 3 53.54	3.975	4 25 46.5	22.98	17 48.3	9	13 44 13.96	2.331	8 5 57.5	11.74	16 26.1			
10	13 5 28.51	3.939	4 34 54.7	22.69	17 45.9	10	13 45 8.99	2.254	8 10 33.8	11.29	16 23.1			
11	13 7 2.59	+3.902	-4 43 55.8	-22.40	17 43.5	11	13 46 2.15	+2.175	-8 14 59.3	-10.83	16 20.0			
12	13 8 35.75	3.869	4 52 49.7	22.09	17 41.1	12	13 46 53.40	2.095	8 19 13.7	10.37	16 16.9			
13	13 10 7.97	3.823	5 1 36.3	21.79	17 38.7	13	13 47 42.72	2.013	8 23 17.0	9.91	16 13.7			
14	13 11 39.24	3.782	5 10 15.5	21.48	17 36.3	14	13 48 30.04	1.930	8 27 9.1	9.43	16 10.5			
15	13 13 9.53	3.741	5 18 47.2	21.16	17 33.8	15	13 49 15.34	1.844	8 30 49.7	8.95	16 7.3			
16	13 14 38.82	+3.699	-5 27 11.2	-20.84	17 31.4	16	13 49 58.56	+1.757	-8 34 18.9	-8.47	16 4.1			
17	13 16 7.09	3.656	5 35 27.5	20.52	17 28.9	17	13 50 39.67	1.668	8 37 36.4	7.98	16 0.8			
18	13 17 34.31	3.612	5 43 36.0	20.19	17 26.4	18	13 51 18.63	1.577	8 40 42.1	7.49	15 57.5			
19	13 19 0.46	3.567	5 51 36.5	19.85	17 23.9	19	13 51 55.39	1.485	8 43 36.0	7.00	15 54.1			
20	13 20 25.52	3.521	5 59 29.0	19.51	17 21.4	20	13 52 29.92	1.391	8 46 18.0	6.50	15 50.7			
21	13 21 49.46	+3.474	-6 7 13.2	-19.17	17 18.8	21	13 53 2.18	+1.296	-8 48 47.8	-5.99	15 47.3			
22	13 23 12.27	3.426	6 14 49.2	18.83	17 16.2	22	13 53 32.12	1.198	8 51 5.4	5.48	15 43.9			
23	13 24 33.91	3.377	6 22 16.9	18.48	17 13.6	23	13 53 59.70	1.099	8 53 10.8	4.97	15 40.4			
24	13 25 54.37	3.327	6 29 36.1	18.12	17 11.0	24	13 54 24.89	0.999	8 55 3.8	4.45	15 36.9			
25	13 27 13.61	3.276	6 36 46.8	17.76	17 8.4	25	13 54 47.64	0.896	8 56 44.3	3.99	15 33.3			
26	13 28 31.61	+3.224	-6 43 48.8	-17.40	17 5.8	26	13 55 7.90	+0.792	-8 58 12.1	-3.39	15 29.7			
27	13 29 48.34	3.170	6 50 42.1	17.04	17 3.1	27	13 55 25.63	0.687	8 59 27.1	2.86	15 26.0			
28	13 31 3.77	3.115	6 57 26.5	16.66	17 0.4	28	13 55 40.78	0.578	9 0 29.2	2.32	15 22.3			
29	13 32 17.86	3.059	7 4 1.9	16.28	16 57.7	29	13 55 53.30	0.466	9 1 18.2	1.77	15 18.6			
30	13 33 30.58	3.001	7 10 28.1	15.90	16 54.9	30	13 56 3.16	0.354	9 1 54.0	1.21	15 14.8			
31	13 34 41.90	+2.942	-7 16 45.1	-15.51	16 52.1	31	13 56 10.30	+0.240	-9 2 16.5	-0.66	15 10.9			
32	13 35 51.78	+2.881	-7 22 52.8	-15.12	16 49.3	32	13 56 14.68	+0.194	-9 2 25.5	-0.09	15 7.0			
Day of the Month.	1st.	5th.	11th.	16th.	21st.	26th.	31st.	Day of the Month.	5th.	10th.	15th.	20th.	25th.	30th.
Semidiameter . .	3.7	3.8	3.9	4.1	4.3	4.5	4.7	Semidiameter . .	4.9	5.1	5.4	5.6	5.9	6.2
Hor. Parallax . .	6.4	6.6	6.9	7.2	7.5	7.8	8.2	Hor. Parallax . .	8.6	9.0	9.4	9.9	10.4	10.9

NOTE.—The sign + indicates north declinations. the sign — indicates south declinations.

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

MARCH.						APRIL.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.				
	h m s	s	o ' "	"	h m		h m s	s	o ' "	"	h m			
1	13 56 3.16	+0.354	-9 1 54.0	-1.21	15 14.8	1	13 37 29.04	-3.185	-7 29 21.0	+15.02	12 53.6			
2	13 56 10.30	0.940	9 2 16.5	0.66	15 10.9	2	13 36 11.64	3.269	7 23 16.6	15.33	12 48.4			
3	13 56 14.68	0.194	9 2 25.5	-0.09	15 7.0	3	13 34 52.46	3.333	7 17 4.9	15.62	12 43.1			
4	13 56 16.26	+0.007	9 2 21.0	+0.48	15 3.1	4	13 33 31.64	3.400	7 10 46.7	15.88	12 37.8			
5	13 56 15.02	-0.119	9 2 2.7	1.05	14 59.1	5	13 32 9.27	3.480	7 4 22.6	16.11	12 32.5			
6	13 56 10.89	-0.232	-9 1 30.6	+1.63	14 55.1	6	13 30 45.55	-3.514	-6 57 53.5	+16.30	12 27.2			
7	13 56 3.86	0.354	9 0 44.7	2.21	14 51.0	7	13 29 20.62	3.561	6 51 20.3	16.45	12 21.9			
8	13 55 53.10	0.477	8 59 44.8	2.79	14 46.9	8	13 27 54.65	3.601	6 44 43.7	16.58	12 16.5			
9	13 55 40.98	0.601	8 58 30.9	3.37	14 42.7	9	13 26 27.80	3.634	6 38 4.6	16.66	12 11.1			
10	13 55 25.07	0.726	8 57 2.8	3.96	14 38.5	10	13 25 0.24	3.660	6 31 23.9	16.71	12 5.7			
11	13 55 6.16	-0.851	-8 55 20.6	+4.55	14 34.2	11	13 23 32.13	-3.679	-6 24 42.6	+16.72	12 0.3			
12	13 54 44.24	0.976	8 53 24.4	5.14	14 29.9	12	13 22 3.67	3.690	6 18 1.6	16.68	11 54.9			
13	13 54 19.32	1.101	8 51 14.1	5.72	14 25.5	13	13 20 35.04	3.693	6 11 21.8	16.61	11 49.5			
14	13 53 51.38	1.226	8 48 49.7	6.30	14 21.1	14	13 19 6.41	3.689	6 4 44.3	16.50	11 44.1			
15	13 53 20.44	1.351	8 46 11.5	6.88	14 16.6	15	13 17 37.96	3.678	5 58 10.0	16.34	11 38.7			
16	13 52 46.51	-1.476	-8 43 19.5	+7.45	14 12.1	16	13 16 9.87	-3.659	-5 51 39.9	+16.15	11 33.3			
17	13 52 9.61	1.599	8 40 13.8	8.02	14 7.5	17	13 14 42.32	3.634	5 45 14.9	15.92	11 27.9			
18	13 51 29.77	1.721	8 36 54.6	8.57	14 2.9	18	13 13 15.47	3.601	5 38 55.8	15.65	11 22.6			
19	13 50 47.01	1.841	8 33 22.1	9.12	13 58.2	19	13 11 49.48	3.562	5 32 43.7	15.35	11 17.2			
20	13 50 1.38	1.960	8 29 36.5	9.67	13 53.5	20	13 10 24.51	3.515	5 26 39.3	15.00	11 11.9			
21	13 49 12.91	-2.078	-8 25 38.1	+10.20	13 48.8	21	13 9 0.72	-3.463	-5 20 43.6	+14.63	11 6.6			
22	13 48 21.64	2.194	8 21 27.1	10.72	13 44.0	22	13 7 38.27	3.405	5 14 57.2	14.22	11 1.3			
23	13 47 27.62	2.307	8 17 3.8	11.23	13 39.1	23	13 6 17.27	3.342	5 9 20.8	13.79	10 56.0			
24	13 46 30.89	2.418	8 12 28.4	11.72	13 34.2	24	13 4 57.86	3.273	5 3 55.2	13.32	10 50.8			
25	13 45 31.54	2.526	8 7 41.5	12.19	13 29.3	25	13 3 40.18	3.198	4 58 41.3	12.83	10 45.6			
26	13 44 29.64	-2.631	-8 2 43.3	+12.65	13 24.3	26	13 2 24.34	-3.119	-4 53 39.4	+12.31	10 40.4			
27	13 43 25.26	2.732	7 57 34.2	13.10	13 19.3	27	13 1 10.48	3.034	4 48 50.3	11.77	10 35.3			
28	13 42 18.48	2.831	7 52 14.6	13.53	13 14.2	28	12 59 58.69	2.946	4 44 14.5	11.20	10 30.2			
29	13 41 9.37	2.926	7 46 45.0	13.94	13 9.1	29	12 58 49.07	2.854	4 39 52.6	10.62	10 25.1			
30	13 39 58.01	3.018	7 41 5.7	14.32	13 4.0	30	12 57 41.72	2.757	4 35 44.9	10.01	10 20.1			
31	13 38 44.53	-3.104	-7 35 17.6	+14.68	12 58.8	31	12 56 36.73	-2.657	-4 31 52.0	+9.39	10 15.1			
32	13 37 29.04	-3.185	-7 29 21.0	+15.02	12 53.6	32	12 55 34.19	-2.553	-4 28 14.2	+8.75	10 10.2			
Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	31st.	Day of the Month.	5th.	10th.	15th.	20th.	25th.	30th.
Semidiameter . .	6.2	6.5	6.8	7.2	7.5	7.8	8.0	Semidiameter . .	8.1	8.3	8.3	8.3	8.2	8.1
Hor. Parallax . .	10.9	11.4	12.0	12.5	13.0	13.4	13.9	Hor. Parallax . .	14.2	14.5	14.6	14.6	14.4	14.2

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

MAY.						JUNE.									
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.				
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.					
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>o</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>o</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>				
1	12 56 36.73	-2.657	-4 31 52.0	+ 9.39	10 15.1	1	12 46 33.78	+1.023	-4 50 55.7	-12.04	8 3.8				
2	12 55 34.19	2.553	4 28 14.2	8.75	10 10.2	2	12 46 59.63	1.130	4 55 51.8	12.63	8 0.3				
3	12 54 34.20	2.445	4 24 52.2	8.09	10 5.3	3	12 47 28.01	1.235	5 1 1.9	13.21	7 56.9				
4	12 53 36.83	2.335	4 21 46.1	7.41	10 0.4	4	12 47 58.90	1.339	5 6 25.7	13.77	7 53.5				
5	12 52 42.14	2.229	4 18 56.4	6.73	9 55.6	5	12 48 32.26	1.441	5 12 3.0	14.33	7 50.1				
6	12 51 50.20	-2.106	-4 16 23.3	+ 6.03	9 50.7	6	12 49 8.06	+1.542	-5 17 53.6	-14.88	7 46.8				
7	12 51 1.07	1.988	4 14 7.1	5.32	9 46.1	7	12 49 46.27	1.642	5 23 57.3	15.42	7 43.5				
8	12 50 14.80	1.867	4 12 8.1	4.60	9 41.4	8	12 50 26.85	1.740	5 30 13.7	15.94	7 40.2				
9	12 49 31.46	1.744	4 10 26.6	3.87	9 36.7	9	12 51 9.77	1.836	5 36 42.6	16.46	7 37.0				
10	12 48 51.08	1.621	4 9 2.5	3.14	9 32.1	10	12 51 54.99	1.931	5 43 23.7	16.96	7 33.8				
11	12 48 13.68	-1.496	-4 7 56.2	+ 2.39	9 27.6	11	12 52 42.46	+2.024	-5 50 16.9	-17.46	7 30.7				
12	12 47 39.29	1.370	4 7 7.6	1.64	9 23.1	12	12 53 32.16	2.116	5 57 21.9	17.95	7 27.6				
13	12 47 7.93	1.242	4 6 36.9	0.91	9 18.7	13	12 54 24.04	2.206	6 4 38.3	18.42	7 24.6				
14	12 46 39.62	1.116	4 6 23.9	+ 0.17	9 14.3	14	12 55 18.07	2.295	6 12 6.0	18.88	7 21.6				
15	12 46 14.35	0.989	4 6 28.9	- 0.58	9 9.9	15	12 56 14.20	2.382	6 19 44.6	19.33	7 18.6				
16	12 45 52.13	-0.862	-4 6 51.6	- 1.32	9 5.6	16	12 57 12.39	+2.467	-6 27 33.8	-19.76	7 15.6				
17	12 45 32.95	0.736	4 7 32.1	2.05	9 1.4	17	12 58 12.60	2.550	6 35 33.3	20.19	7 12.7				
18	12 45 16.80	0.610	4 8 30.1	2.78	8 57.3	18	12 59 14.80	2.632	6 43 42.9	20.61	7 9.8				
19	12 45 3.66	0.485	4 9 45.5	3.50	8 53.2	19	13 0 18.94	2.712	6 52 2.4	21.01	7 6.9				
20	12 44 53.50	0.361	4 11 18.2	4.22	8 49.1	20	13 1 24.99	2.791	7 0 31.3	21.40	7 4.1				
21	12 44 46.31	-0.238	-4 13 7.9	- 4.22	8 45.1	21	13 2 32.91	+2.868	-7 9 9.5	-21.78	7 1.3				
22	12 44 42.06	-0.117	4 15 14.5	5.02	8 41.1	22	13 3 42.66	2.944	7 17 56.6	22.14	6 58.5				
23	12 44 40.72	+0.004	4 17 37.8	6.31	8 37.1	23	13 4 54.21	3.018	7 26 52.3	22.50	6 55.8				
24	12 44 42.25	0.123	4 20 17.5	6.99	8 33.2	24	13 6 7.53	3.091	7 35 56.4	22.84	6 53.1				
25	12 44 46.61	0.240	4 23 13.3	7.66	8 29.4	25	13 7 22.60	3.163	7 45 8.7	23.17	6 50.4				
26	12 44 53.78	+0.356	-4 26 25.1	- 8.32	8 25.6	26	13 8 39.36	+3.234	-7 54 28.8	-23.50	6 47.7				
27	12 45 3.72	0.471	4 29 52.5	8.96	8 21.8	27	13 9 57.82	3.305	8 3 56.6	23.81	6 45.1				
28	12 45 16.40	0.585	4 33 35.4	9.60	8 18.1	28	13 11 17.93	3.372	8 13 31.9	24.12	6 42.5				
29	12 45 31.78	0.696	4 37 33.4	10.23	8 14.5	29	13 12 39.68	3.440	8 23 14.4	24.41	6 40.0				
30	12 45 49.83	0.807	4 41 46.2	10.84	8 10.9	30	13 14 3.05	3.507	8 33 3.8	24.70	6 37.4				
31	12 46 10.51	+0.916	-4 46 13.8	-11.45	8 7.3	31	13 15 23.01	+3.573	-8 43 0.0	-24.98	6 34.9				
32	12 46 33.78	+1.023	-4 50 55.7	-12.04	8 3.8	32	13 16 54.54	+3.638	-8 53 2.8	-25.25	6 32.4				
Day of the Month.		5th.	10th.	15th.	20th.	25th.	30th.	Day of the Month.		4th.	9th.	14th.	19th.	24th.	29th.
Semidiameter . .		7.9	7.7	7.5	7.2	7.0	6.7	Semidiameter . .		6.5	6.2	6.0	5.8	5.6	5.4
Hor. Parallax . .		13.9	13.5	13.1	12.7	12.2	11.8	Hor. Parallax . .		11.3	10.9	10.5	10.1	9.8	9.4

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.	Noon.	
h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m	
1	13 15 28.01	+3.573	- 8 43 0.0	-24.98	6 34.9	1	14 10 52.26	+5.900	-14 27 42.7	-29.16	5 28.3
2	13 16 54.54	3.638	8 53 2.8	25.25	6 32.4	2	14 12 59.08	5.307	14 39 22.5	29.15	5 26.5
3	13 18 22.62	3.702	9 3 11.9	25.51	6 29.9	3	14 15 7.03	5.354	14 51 2.1	29.14	5 24.7
4	13 19 52.24	3.766	9 13 27.2	25.76	6 27.5	4	14 17 16.09	5.401	15 2 41.4	29.12	5 22.9
5	13 21 23.38	3.829	9 23 48.4	26.01	6 25.1	5	14 19 26.27	5.447	15 14 20.1	29.10	5 21.1
6	13 22 56.01	+3.891	- 9 34 15.4	-26.24	6 22.7	6	14 21 37.56	+5.493	-15 25 58.0	-29.06	5 19.4
7	13 24 30.13	3.952	9 44 48.0	26.47	6 20.3	7	14 23 49.95	5.539	15 37 34.8	29.01	5 17.7
8	13 26 5.72	4.013	9 55 25.9	26.69	6 18.0	8	14 26 3.44	5.585	15 49 10.5	28.96	5 16.0
9	13 27 42.75	4.073	10 6 9.0	26.90	6 15.7	9	14 28 18.01	5.630	16 0 44.8	28.90	5 14.3
10	13 29 21.21	4.132	10 16 57.0	27.10	6 13.4	10	14 30 33.66	5.674	16 12 17.5	28.83	5 12.6
11	13 31 1.08	+4.190	-10 27 49.7	-27.29	6 11.1	11	14 32 50.38	+5.719	-16 23 48.4	-28.74	5 10.9
12	13 32 42.32	4.247	10 38 46.9	27.47	6 8.9	12	14 35 8.17	5.763	16 35 17.2	28.65	5 9.3
13	13 34 24.94	4.304	10 49 48.3	27.64	6 6.7	13	14 37 27.01	5.807	16 46 43.8	28.55	5 7.7
14	13 36 8.91	4.360	11 0 53.8	27.81	6 4.5	14	14 39 46.91	5.850	16 58 7.9	28.45	5 6.1
15	13 37 54.21	4.415	11 12 3.1	27.96	6 2.3	15	14 42 7.83	5.893	17 9 29.2	28.33	5 4.5
16	13 39 40.82	+4.469	-11 23 16.0	-28.11	6 0.1	16	14 44 29.79	+5.936	-17 20 47.5	-28.20	5 2.9
17	13 41 28.72	4.522	11 34 32.2	28.24	5 58.0	17	14 46 52.77	5.979	17 32 2.7	28.06	5 1.4
18	13 43 17.89	4.575	11 45 51.6	28.36	5 55.9	18	14 49 16.77	6.021	17 43 14.4	27.91	4 59.9
19	13 45 8.32	4.627	11 57 13.8	28.48	5 53.8	19	14 51 41.77	6.063	17 54 22.5	27.76	4 58.4
20	13 46 59.99	4.678	12 8 38.6	28.58	5 51.7	20	14 54 7.78	6.104	18 5 26.7	27.59	4 56.9
21	13 48 52.87	+4.739	-12 20 5.8	-28.68	5 49.6	21	14 56 34.77	+6.145	-18 16 26.8	-27.41	4 55.4
22	13 50 46.97	4.779	12 31 35.2	28.76	5 47.6	22	14 59 2.76	6.187	18 27 22.6	27.23	4 53.9
23	13 52 42.26	4.829	12 43 6.5	28.84	5 45.6	23	15 1 31.73	6.228	18 38 13.8	27.04	4 52.4
24	13 54 38.74	4.878	12 54 39.6	28.91	5 43.6	24	15 4 1.69	6.269	18 49 0.3	26.84	4 50.9
25	13 56 36.39	4.927	13 6 14.2	28.97	5 41.6	25	15 6 32.63	6.310	18 59 41.9	26.63	4 49.5
26	13 58 35.21	+4.975	-13 17 50.2	-29.02	5 39.6	26	15 9 4.55	+6.351	-19 10 18.3	-26.41	4 48.1
27	14 0 35.19	5.023	13 29 27.3	29.06	5 37.7	27	15 11 37.46	6.391	19 20 49.4	26.17	4 46.7
28	14 2 36.32	5.071	13 41 5.3	29.10	5 35.8	28	15 14 11.34	6.432	19 31 14.9	25.94	4 45.3
29	14 4 38.61	5.119	13 52 44.1	29.12	5 33.9	29	15 16 46.19	6.473	19 41 34.6	25.70	4 43.9
30	14 6 42.02	5.166	14 4 23.3	29.14	5 32.0	30	15 19 22.02	6.513	19 51 48.4	25.44	4 42.6
31	14 8 46.57	+5.213	-14 16 2.9	-29.15	5 30.1	31	15 21 58.82	+6.554	-20 1 56.0	-25.18	4 41.3
32	14 10 52.26	+5.260	-14 27 42.7	-29.16	5 28.3	32	15 24 36.59	+6.594	-20 11 57.2	-24.92	4 40.0

Day of the Month.	4th.	9th.	14th.	19th.	24th.	29th.	Day of the Month.	3d.	8th.	13th.	18th.	23d.	28th.
Semidiameter ..	5.2	5.0	4.9	4.7	4.6	4.5	Semidiameter ..	4.4	4.2	4.1	4.0	3.9	3.9
Hor. Parallax ..	9.1	8.8	8.5	8.3	8.1	7.8	Hor. Parallax ..	7.6	7.4	7.3	7.1	6.9	6.8

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.							
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.		
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.			
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m		
1	15 24 36.59	+6.594	-20 11 57.2	-24.92	4 40.0	1	16 50 25.05	+7.651	-24 5 37.1	-12.73	4 7.7		
2	15 27 15.33	6.634	20 21 51.9	24.64	4 38.7	2	16 53 29.03	7.690	24 10 36.3	12.20	4 6.8		
3	15 29 55.03	6.674	20 31 39.8	24.35	4 37.4	3	16 56 33.70	7.709	24 15 22.7	11.06	4 5.9		
4	15 32 35.68	6.713	20 41 20.8	24.06	4 36.1	4	16 59 39.05	7.737	24 19 56.1	11.12	4 5.0		
5	15 35 17.29	6.753	20 50 54.5	23.75	4 34.9	5	17 2 45.07	7.764	24 24 16.4	10.56	4 4.2		
6	15 37 59.86	+6.793	-21 0 20.9	-23.44	4 33.7	6	17 5 51.74	+7.791	-24 28 23.3	-10.01	4 3.4		
7	15 40 43.36	6.833	21 9 39.6	23.12	4 32.5	7	17 8 59.04	7.817	24 32 16.7	9.44	4 2.6		
8	15 43 27.80	6.871	21 18 50.5	22.79	4 31.3	8	17 12 6.97	7.843	24 35 56.4	8.87	4 1.8		
9	15 46 13.16	6.909	21 27 53.3	22.45	4 30.1	9	17 15 15.49	7.867	24 39 22.3	8.29	4 1.0		
10	15 48 59.44	6.947	21 36 47.9	22.10	4 28.9	10	17 18 24.59	7.891	24 42 34.3	7.70	4 0.2		
11	15 51 46.02	+6.984	-21 45 33.9	-21.74	4 27.8	11	17 21 34.26	+7.914	-24 45 32.1	-7.12	3 59.4		
12	15 54 34.69	7.021	21 54 11.2	21.37	4 26.7	12	17 24 44.47	7.936	24 48 15.7	6.52	3 58.6		
13	15 57 23.65	7.058	22 2 39.6	20.99	4 25.6	13	17 27 55.20	7.958	24 50 45.0	5.91	3 57.8		
14	16 0 13.48	7.094	22 10 58.7	20.60	4 24.5	14	17 31 6.44	7.978	24 52 59.7	5.31	3 57.1		
15	16 3 4.17	7.130	22 19 8.5	20.21	4 23.4	15	17 34 18.16	7.998	24 54 59.7	4.69	3 56.4		
16	16 5 55.73	+7.166	-22 27 8.6	-19.80	4 22.3	16	17 37 30.34	+8.017	-24 56 45.0	-4.07	3 55.7		
17	16 8 48.12	7.200	22 34 58.9	19.39	4 21.2	17	17 40 42.97	8.035	24 58 15.3	3.45	3 54.9		
18	16 11 41.34	7.235	22 42 39.1	18.96	4 20.1	18	17 43 56.04	8.053	24 59 30.6	2.82	3 54.2		
19	16 14 35.38	7.269	22 50 9.0	18.53	4 19.1	19	17 47 9.51	8.070	25 0 30.8	2.19	3 53.5		
20	16 17 30.24	7.302	22 57 28.5	18.09	4 18.1	20	17 50 23.38	8.086	25 1 15.8	1.56	3 52.8		
21	16 20 25.90	+7.336	-23 4 37.3	-17.64	4 17.1	21	17 53 37.63	+8.101	-25 1 45.4	-0.92	3 52.1		
22	16 23 22.36	7.369	23 11 35.3	17.19	4 16.1	22	17 56 52.24	8.116	25 1 59.7	-0.37	3 51.4		
23	16 26 19.61	7.402	23 18 22.2	16.72	4 15.1	23	18 0 7.19	8.130	25 1 58.5	+0.37	3 50.7		
24	16 29 17.64	7.434	23 24 57.8	16.24	4 14.1	24	18 3 22.47	8.143	25 1 41.8	1.02	3 50.0		
25	16 32 16.44	7.466	23 31 22.0	15.76	4 13.1	25	18 6 38.07	8.156	25 1 9.5	1.67	3 49.3		
26	16 35 16.01	+7.498	-23 37 34.6	-15.28	4 12.2	26	18 9 53.96	+8.168	-25 0 21.5	+2.33	3 48.6		
27	16 38 16.34	7.529	23 43 35.4	14.78	4 11.3	27	18 13 10.13	8.179	24 59 17.7	2.99	3 47.9		
28	16 41 17.42	7.560	23 49 24.2	14.28	4 10.4	28	18 16 26.57	8.190	24 57 58.2	3.65	3 47.2		
29	16 44 19.23	7.591	23 55 0.9	13.77	4 9.5	29	18 19 43.26	8.200	24 56 22.8	4.31	3 46.5		
30	16 47 21.78	7.621	24 0 25.2	13.25	4 8.6	30	18 23 0.17	8.209	24 54 31.6	4.97	3 45.9		
31	16 50 25.05	+7.651	-24 5 37.1	-12.73	4 7.7	31	18 26 17.30	+8.218	-24 52 24.4	+5.63	3 45.3		
32	16 53 29.03	+7.680	-24 10 36.3	-12.20	4 6.8	32	18 29 34.63	+8.226	-24 50 1.3	+6.30	3 44.7		
Day of the Month.	2d.	7th.	12th.	17th.	22d.	27th.	Day of the Month.	2d.	7th.	12th.	17th.	22d.	27th.
Semidiameter . . .	3.8	3.7	3.6	3.6	3.5	3.4	Semidiameter . .	3.4	3.3	3.3	3.2	3.2	3.1
Hor. Parallax . . .	6.6	6.5	6.4	6.2	6.1	6.0	Hor. Parallax . .	5.9	5.8	5.7	5.6	5.5	5.4

NOTE.—The sign + indicates north declinations: the sign — indicates south declinations.

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.								
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.			
Noon.	Noon.	Noon.	Noon.	Noon.	h m	Noon.	Noon.	Noon.	Noon.	Noon.	h m			
h m s	s	° ' "	"	"		h m s	s	° ' "	"	"	h m			
1 18 29 34.63	+8.226	-24 50 1.3	+ 6.30	3 44.7		1 20 8 9.22	+8.104	-21 36 20.4	+25.58	3 25.0				
2 18 32 52.13	8.233	24 47 22.2	6.96	3 44.1		2 20 11 23.56	8.091	21 25 59.5	26.16	3 24.3				
3 18 36 9.79	8.239	24 44 27.1	7.63	3 43.5		3 20 14 37.59	8.078	21 15 24.6	26.74	3 23.6				
4 18 39 27.58	8.244	24 41 16.1	8.29	3 42.8		4 20 17 51.30	8.064	21 4 36.0	27.31	3 22.9				
5 18 42 45.48	8.248	24 37 49.0	8.96	3 42.1		5 20 21 4.67	8.050	20 53 33.7	27.88	3 22.1				
6 18 46 3.48	+8.252	-24 34 5.9	+ 9.63	3 41.5		6 20 24 17.69	+8.035	-20 42 17.9	+28.44	3 21.4				
7 18 49 21.56	8.254	24 30 6.7	10.30	3 40.9		7 20 27 30.35	8.020	20 30 48.8	28.99	3 20.7				
8 18 52 39.69	8.256	24 25 51.6	10.96	3 40.3		8 20 30 42.64	8.004	20 19 6.6	29.53	3 20.0				
9 18 55 57.85	8.257	24 21 20.5	11.63	3 39.6		9 20 33 54.55	7.988	20 7 11.4	30.07	3 19.2				
10 18 59 16.02	8.257	24 16 33.4	12.29	3 38.9		10 20 37 6.08	7.971	19 55 3.4	30.60	3 18.4				
11 19 2 34.17	+8.256	-24 11 30.4	+12.95	3 38.3		11 20 40 17.21	+7.955	-19 42 42.7	+31.12	3 17.7				
12 19 5 52.29	8.254	24 6 11.5	13.62	3 37.7		12 20 43 27.94	7.938	19 30 9.5	31.64	3 17.0				
13 19 9 10.36	8.252	24 0 36.8	14.28	3 37.1		13 20 46 38.25	7.921	19 17 24.1	32.14	3 16.2				
14 19 12 28.37	8.248	23 54 46.2	14.93	3 36.4		14 20 49 48.14	7.903	19 4 26.6	32.64	3 15.4				
15 19 15 46.28	8.245	23 48 39.9	15.59	3 35.7		15 20 52 57.61	7.885	18 51 17.2	33.13	3 14.6				
16 19 19 4.09	+8.239	-23 42 17.8	+16.24	3 35.1		16 20 56 6.64	+7.867	-18 37 56.1	+33.62	3 13.8				
17 19 22 21.77	8.234	23 35 40.2	16.89	3 34.5		17 20 59 15.25	7.849	18 24 23.4	34.10	3 13.0				
18 19 25 39.32	8.228	23 28 47.0	17.54	3 33.8		18 21 2 23.42	7.831	18 10 39.4	34.57	3 12.1				
19 19 28 56.71	8.221	23 21 38.3	18.18	3 33.1		19 21 5 31.16	7.813	17 56 44.2	35.03	3 11.3				
20 19 32 13.94	8.214	23 14 14.2	18.82	3 32.4		20 21 8 38.45	7.795	17 42 38.1	35.48	3 10.5				
21 19 35 31.00	+8.207	-23 6 34.9	+19.46	3 31.8		21 21 11 45.31	+7.777	-17 28 21.1	+35.93	3 9.6				
22 19 38 47.86	8.199	22 58 40.2	20.09	3 31.2		22 21 14 51.74	7.759	17 13 53.6	36.37	3 8.7				
23 19 42 4.53	8.190	22 50 30.4	20.72	3 30.5		23 21 17 57.73	7.741	16 59 15.6	36.80	3 7.9				
24 19 45 20.98	8.181	22 42 5.7	21.35	3 29.8		24 21 21 3.29	7.723	16 44 27.4	37.22	3 7.1				
25 19 48 37.20	8.171	22 33 25.9	21.96	3 29.1		25 21 24 8.41	7.704	16 29 29.2	37.63	3 6.3				
26 19 51 53.18	+8.161	-22 24 31.4	+22.58	3 28.5		26 21 27 13.10	+7.686	-16 14 21.1	+38.04	3 5.4				
27 19 55 8.92	8.151	22 15 22.2	23.19	3 27.8		27 21 30 17.35	7.668	15 59 3.4	38.43	3 4.5				
28 19 58 24.41	8.140	22 5 58.4	23.80	3 27.1		28 21 33 21.17	7.650	15 43 36.3	38.82	3 3.6				
29 20 1 39.63	8.128	21 56 20.0	24.40	3 26.4		29 21 36 24.57	7.632	15 27 59.9	39.20	3 2.7				
30 20 4 54.57	8.117	21 46 27.3	24.99	3 25.7		30 21 39 27.53	7.614	15 12 14.4	39.58	3 1.9				
31 20 8 9.22	+8.104	-21 36 20.4	+25.58	3 25.0		31 21 42 30.07	+7.597	-14 56 20.2	+39.94	3 1.0				
32 20 11 23.56	+8.091	-21 25 59.5	+26.16	3 24.3		32 21 45 32.18	+7.579	-14 40 17.3	+40.30	3 0.1				
Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	Day of the Month.	1st.	6th.	11th.	16th.	21st.	26th.	31st.
Semidiameter . .	3.1	3.0	3.0	2.9	2.9	2.8	Semidiameter . .	2.8	2.8	2.7	2.7	2.7	2.6	2.6
Hor. Parallax . .	5.4	5.3	5.2	5.1	5.1	5.0	Hor. Parallax . .	4.9	4.9	4.8	4.7	4.7	4.6	4.6

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.



## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.											
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.						
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.								
h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m							
1 15 42 12.73	+1.947	-18 47 12.0	-6.30	20 57.1	1	16 3 27.26	+1.498	-19 49 57.4	-3.79	19 16.2							
2 15 42 59.31	1.935	18 49 42.4	6.23	20 54.0	2	16 4 1.29	1.406	19 51 27.5	3.71	19 12.8							
3 15 43 45.60	1.923	18 52 10.8	6.15	20 50.8	3	16 4 34.78	1.384	19 52 55.5	3.63	19 9.4							
4 15 44 31.59	1.910	18 54 37.4	6.07	20 47.6	4	16 5 7.74	1.362	19 54 21.6	3.55	19 6.0							
5 15 45 17.28	1.897	18 57 2.2	5.99	20 44.5	5	16 5 40.16	1.339	19 55 45.8	3.47	19 2.6							
6 15 46 2.66	+1.884	-18 59 25.1	-5.91	20 41.3	6	16 6 12.03	+1.316	-19 57 8.0	-3.39	18 59.2							
7 15 46 47.72	1.871	19 1 46.1	5.83	20 38.1	7	16 6 43.33	1.293	19 58 28.2	3.30	18 55.8							
8 15 47 32.46	1.857	19 4 5.2	5.75	20 34.9	8	16 7 14.07	1.269	19 59 46.4	3.22	18 52.4							
9 15 48 16.86	1.843	19 6 22.3	5.67	20 31.7	9	16 7 44.24	1.245	20 1 2.7	3.14	18 48.9							
10 15 49 0.91	1.829	19 8 37.5	5.59	20 28.5	10	16 8 13.82	1.220	20 2 17.0	3.05	18 45.5							
11 15 49 44.61	+1.814	-19 10 50.8	-5.51	20 25.3	11	16 8 42.80	+1.195	-20 3 29.3	-2.97	18 42.0							
12 15 50 27.96	1.799	19 13 2.2	5.43	20 22.0	12	16 9 11.18	1.170	20 4 39.6	2.89	18 38.5							
13 15 51 10.93	1.783	19 15 11.7	5.35	20 18.8	13	16 9 38.95	1.144	20 5 48.0	2.81	18 35.0							
14 15 51 53.53	1.767	19 17 19.2	5.27	20 15.6	14	16 10 6.10	1.118	20 6 54.3	2.72	18 31.6							
15 15 52 35.74	1.751	19 19 24.7	5.19	20 12.4	15	16 10 32.62	1.092	20 7 58.7	2.64	18 28.1							
16 15 53 17.56	+1.734	-19 21 28.3	-5.11	20 9.1	16	16 10 58.52	+1.066	-20 9 1.1	-2.56	18 24.6							
17 15 53 58.98	1.717	19 23 30.0	5.03	20 5.9	17	16 11 23.78	1.039	20 10 1.6	2.47	18 21.1							
18 15 54 39.99	1.700	19 25 29.7	4.95	20 2.6	18	16 11 48.39	1.012	20 11 0.0	2.39	18 17.6							
19 15 55 20.59	1.683	19 27 27.3	4.86	19 59.3	19	16 12 12.35	0.985	20 11 56.5	2.31	18 14.1							
20 15 56 0.77	1.665	19 29 23.0	4.78	19 56.0	20	16 12 35.65	0.957	20 12 51.0	2.23	18 10.5							
21 15 56 40.51	+1.647	-19 31 16.7	-4.70	19 52.8	21	16 12 58.30	+0.929	-20 13 43.6	-2.15	18 6.9							
22 15 57 19.81	1.629	19 33 8.5	4.62	19 49.5	22	16 13 20.27	0.901	20 14 34.2	2.07	18 3.3							
23 15 57 58.67	1.610	19 34 58.2	4.53	19 46.2	23	16 13 41.57	0.873	20 15 22.9	1.99	17 59.7							
24 15 58 37.08	1.591	19 36 46.0	4.45	19 42.9	24	16 14 2.18	0.845	20 16 9.7	1.91	17 56.1							
25 15 59 15.03	1.572	19 38 31.9	4.37	19 39.6	25	16 14 22.11	0.816	20 16 54.5	1.83	17 52.5							
26 15 59 52.52	+1.552	-19 40 15.7	-4.29	19 36.3	26	16 14 41.34	+0.787	-20 17 37.4	-1.75	17 48.9							
27 16 0 29.53	1.532	19 41 57.6	4.21	19 32.9	27	16 14 59.88	0.758	20 18 18.4	1.67	17 45.3							
28 16 1 6.07	1.512	19 43 37.5	4.13	19 29.6	28	16 15 17.72	0.729	20 18 57.5	1.59	17 41.6							
29 16 1 42.11	1.492	19 45 15.4	4.04	19 26.2	29	16 15 34.84	0.698	20 19 34.6	1.51	17 37.9							
30 16 2 17.67	1.471	19 46 51.4	3.96	19 22.9	30	16 15 51.25	0.668	20 20 9.8	1.43	17 34.3							
31 16 2 52.72	+1.450	-19 48 25.4	-3.88	19 19.5	31	16 16 6.93	+0.638	-20 20 43.2	-1.35	17 30.6							
32 16 3 27.26	+1.428	-19 49 57.4	-3.79	19 16.2	32	16 16 21.89	+0.608	-20 21 14.6	-1.27	17 26.9							
Day of the Month.					1st.	9th.	17th.	25th.	Day of the Month.					2d.	10th.	18th.	26th.
Polar Semidiameter . .					15.5	15.7	16.0	16.3	Polar Semidiameter . .					16.7	17.1	17.5	17.9
Horizontal Parallax . .					1.5	1.5	1.5	1.5	Horizontal Parallax . .					1.6	1.6	1.6	1.7

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.



## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			h m s	s	° ' "	"	
1	16 8 48.17	-1.132	-19 58 5.9	+2.98	13 27.0	1	15 52 57.52	-1.929	-19 15 26.7	+3.51	11 9.3
2	16 8 20.79	1.150	19 56 53.8	3.03	13 22.6	2	15 52 26.93	1.269	19 14 2.6	3.49	11 4.8
3	16 7 52.99	1.167	19 55 40.6	3.08	13 18.2	3	15 51 56.58	1.259	19 12 39.1	3.46	11 0.4
4	16 7 24.78	1.183	19 54 26.2	3.12	13 13.8	4	15 51 26.49	1.248	19 11 16.2	3.43	10 56.0
5	16 6 56.19	1.199	19 53 10.7	3.17	13 9.3	5	15 50 56.67	1.236	19 9 54.1	3.40	10 51.6
6	16 6 27.23	-1.214	-19 51 54.1	+3.21	13 4.9	6	15 50 27.16	-1.223	-19 8 32.8	+3.37	10 47.1
7	16 5 57.93	1.228	19 50 36.5	3.25	13 0.5	7	15 49 57.96	1.209	19 7 12.4	3.33	10 42.7
8	16 5 28.31	1.241	19 49 18.0	3.29	12 56.1	8	15 49 29.11	1.194	19 5 52.9	3.29	10 38.3
9	16 4 58.38	1.253	19 47 58.5	3.33	12 51.7	9	15 49 0.62	1.179	19 4 34.4	3.25	10 33.9
10	16 4 28.17	1.264	19 46 38.1	3.36	12 47.2	10	15 48 32.51	1.163	19 3 17.1	3.20	10 29.5
11	16 3 57.70	-1.274	-19 45 16.9	+3.40	12 42.8	11	15 48 4.81	-1.146	-19 2 0.8	+3.15	10 25.1
12	16 3 27.00	1.283	19 43 54.9	3.43	12 38.4	12	15 47 37.52	1.128	19 0 45.8	3.10	10 20.8
13	16 2 56.08	1.292	19 42 32.2	3.46	12 33.9	13	15 47 10.67	1.109	18 59 32.2	3.05	10 16.4
14	16 2 24.97	1.299	19 41 8.9	3.49	12 29.5	14	15 46 44.27	1.090	18 58 19.8	2.99	10 12.0
15	16 1 53.69	1.305	19 39 45.0	3.51	12 25.0	15	15 46 18.34	1.070	18 57 8.8	2.93	10 7.7
16	16 1 22.26	-1.312	-19 38 20.5	+3.53	12 20.6	16	15 45 52.89	-1.049	-18 55 59.3	+2.87	10 3.3
17	16 0 50.71	1.317	19 36 55.6	3.55	12 16.1	17	15 45 27.94	1.028	18 54 51.3	2.80	9 59.0
18	16 0 19.06	1.321	19 35 30.2	3.57	12 11.7	18	15 45 3.51	1.007	18 53 44.9	2.73	9 54.6
19	15 59 47.34	1.323	19 34 4.5	3.58	12 7.2	19	15 44 39.61	0.985	18 52 40.2	2.66	9 50.3
20	15 59 15.55	1.325	19 32 38.5	3.59	12 2.8	20	15 44 16.24	0.962	18 51 37.2	2.59	9 46.0
21	15 58 43.73	-1.326	-19 31 12.3	+3.60	11 58.3	21	15 43 53.43	-0.939	-18 50 35.9	+2.52	9 41.7
22	15 58 11.90	1.326	19 29 45.9	3.60	11 53.8	22	15 43 31.19	0.915	18 49 36.4	2.44	9 37.4
23	15 57 40.07	1.326	19 28 19.5	3.60	11 49.3	23	15 43 9.53	0.891	18 48 38.7	2.36	9 33.1
24	15 57 8.28	1.324	19 26 52.9	3.61	11 44.9	24	15 42 48.45	0.866	18 47 42.9	2.28	9 28.8
25	15 56 36.54	1.321	19 25 26.4	3.60	11 40.4	25	15 42 27.97	0.840	18 46 49.1	2.20	9 24.6
26	15 56 4.87	-1.317	-19 24 0.0	+3.60	11 36.0	26	15 42 8.11	-0.814	-18 45 57.2	+2.12	9 20.3
27	15 55 33.30	1.313	19 22 33.7	3.59	11 31.5	27	15 41 48.86	0.789	18 45 7.3	2.03	9 16.1
28	15 55 1.83	1.308	19 21 7.6	3.58	11 27.1	28	15 41 30.24	0.762	18 44 19.5	1.95	9 11.9
29	15 54 30.50	1.302	19 19 41.8	3.57	11 22.6	29	15 41 12.26	0.735	18 43 33.7	1.86	9 7.6
30	15 53 59.32	1.295	19 18 16.4	3.55	11 18.2	30	15 40 54.93	0.708	18 42 50.1	1.77	9 3.4
31	15 53 28.32	-1.288	-19 16 51.3	+3.53	11 13.7	31	15 40 38.26	-0.680	-18 42 8.7	+1.68	8 59.2
32	15 52 57.52	-1.279	-19 15 26.7	+3.51	11 9.3	32	15 40 22.26	-0.652	-18 41 29.5	+1.59	8 55.0
Day of the Month.		8th.	16th.	24th.	32d.	Day of the Month.		1st.	9th.	17th.	25th.
Polar Semidiameter . .		21".5	21".6	21".6	21".6	Polar Semidiameter . .		21".6	21".4	21".2	20".9
Horizontal Parallax . .		2.0	2.0	2.0	2.0	Horizontal Parallax . .		2.0	2.0	2.0	2.0

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.	Noon.	
<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>h m s</i>	<i>h m</i>		<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>h m</i>	<i>h m</i>	
1	15 40 38.26	-0.680	18 42 8.7	+1.68	8 59.2	1	15 37 59.26	+0.366	18 40 45.3	-1.50	6 54.8
2	15 40 22.26	0.652	18 41 29.5	1.59	8 55.0	2	15 38 6.02	0.397	18 41 22.5	1.60	6 51.0
3	15 40 6.93	0.693	18 40 52.4	1.49	8 50.8	3	15 38 13.51	0.398	18 42 2.1	1.70	6 47.2
4	15 39 52.29	0.595	18 40 17.6	1.40	8 46.6	4	15 38 21.73	0.359	18 42 44.2	1.80	6 43.4
5	15 39 38.34	0.566	18 39 45.2	1.31	8 42.5	5	15 38 30.70	0.389	18 43 28.7	1.90	6 39.6
6	15 39 25.09	-0.537	18 39 15.1	+1.91	8 38.3	6	15 38 40.39	+0.420	18 44 15.5	-2.00	6 35.8
7	15 39 12.55	0.507	18 38 47.3	1.11	8 34.2	7	15 38 50.82	0.450	18 45 4.7	2.10	6 32.1
8	15 39 0.73	0.477	18 38 22.0	1.01	8 30.1	8	15 39 1.96	0.480	18 45 56.2	2.20	6 28.3
9	15 38 49.63	0.447	18 37 59.1	0.90	8 26.0	9	15 39 13.84	0.510	18 46 50.1	2.30	6 24.6
10	15 38 39.25	0.417	18 37 38.6	0.80	8 21.9	10	15 39 26.43	0.540	18 47 46.2	2.39	6 20.9
11	15 38 29.60	-0.387	18 37 20.6	+0.70	8 17.8	11	15 39 39.74	+0.569	18 48 44.6	-2.48	6 17.2
12	15 38 20.70	0.357	18 37 5.2	0.59	8 13.7	12	15 39 53.75	0.599	18 49 45.2	2.57	6 13.5
13	15 38 12.53	0.325	18 36 52.2	0.49	8 9.6	13	15 40 6.47	0.628	18 50 48.1	2.66	6 9.8
14	15 38 5.10	0.294	18 36 41.7	0.39	8 5.6	14	15 40 23.90	0.657	18 51 53.1	2.75	6 6.1
15	15 37 58.42	0.263	18 36 33.7	0.28	8 1.5	15	15 40 40.02	0.686	18 53 0.3	2.84	6 2.5
16	15 37 52.49	-0.229	18 36 28.3	+0.18	7 57.5	16	15 40 56.82	+0.715	18 54 9.6	-2.93	5 58.8
17	15 37 47.31	0.201	18 36 25.4	+0.07	7 53.5	17	15 41 14.31	0.743	18 55 21.0	3.02	5 55.2
18	15 37 42.87	0.169	18 36 25.1	-0.04	7 49.5	18	15 41 32.47	0.771	18 56 34.4	3.11	5 51.6
19	15 37 39.18	0.136	18 36 27.3	0.15	7 45.5	19	15 41 51.31	0.799	18 57 49.9	3.19	5 47.9
20	15 37 36.25	0.107	18 36 32.1	0.26	7 41.5	20	15 42 10.82	0.827	18 59 7.3	3.27	5 44.3
21	15 37 34.06	-0.076	18 36 39.4	-0.36	7 37.6	21	15 42 31.00	+0.854	19 0 26.7	-3.35	5 40.7
22	15 37 32.62	0.045	18 36 49.2	0.47	7 33.6	22	15 42 51.81	0.881	19 1 47.9	3.43	5 37.2
23	15 37 31.92	-0.013	18 37 1.5	0.57	7 29.7	23	15 43 13.29	0.908	19 3 11.0	3.50	5 33.6
24	15 37 31.98	+0.018	18 37 16.4	0.67	7 25.8	24	15 43 35.41	0.935	19 4 36.0	3.58	5 30.0
25	15 37 32.79	0.049	18 37 33.8	0.78	7 21.9	25	15 43 58.18	0.962	19 6 2.8	3.66	5 26.5
26	15 37 34.34	+0.080	18 37 53.7	-0.89	7 18.0	26	15 44 21.58	+0.988	19 7 31.3	-3.73	5 22.9
27	15 37 36.63	0.111	18 38 16.1	0.99	7 14.1	27	15 44 45.62	1.015	19 9 1.6	3.80	5 19.4
28	15 37 39.67	0.142	18 38 41.0	1.10	7 10.2	28	15 45 10.38	1.041	19 10 33.7	3.87	5 15.9
29	15 37 43.46	0.173	18 39 8.4	1.20	7 6.3	29	15 45 35.56	1.067	19 12 7.3	3.94	5 12.4
30	15 37 47.98	0.204	18 39 38.3	1.30	7 2.5	30	15 46 1.47	1.093	19 13 42.6	4.01	5 8.9
31	15 37 53.25	+0.235	18 40 10.6	-1.40	6 58.6	31	15 46 27.99	+1.118	19 15 19.5	-4.08	5 5.4
32	15 37 59.26	+0.266	18 40 45.3	-1.50	6 54.8	32	15 46 55.11	+1.143	19 16 58.0	-4.15	5 1.9
Day of the Month.	3d.	11th.	19th.	27th.		Day of the Month.	4th.	12th.	20th.	28th.	
Polar Semidiameter . .	20.5	20.1	19.7	19.3		Polar Semidiameter . .	18.8	18.4	18.0	17.6	
Horizontal Parallax . .	1.9	1.9	1.8	1.8		Horizontal Parallax . .	1.8	1.7	1.7	1.6	

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			h m s	s	° ' "	"	
1	15 46 55.11	+1.143	-19 16 58.0	-4.15	5 1.9	1	16 4 43.14	+1.787	-20 15 11.0	-5.32	3 21.6
2	15 47 22.85	1.168	19 18 38.0	4.21	4 58.4	2	16 5 26.24	1.805	20 17 18.8	5.34	3 18.4
3	15 47 51.18	1.193	19 20 19.5	4.27	4 54.9	3	16 6 9.75	1.822	20 19 27.1	5.35	3 15.2
4	15 48 20.11	1.218	19 22 2.5	4.32	4 51.4	4	16 6 53.69	1.839	20 21 35.6	5.36	3 12.0
5	15 48 49.62	1.242	19 23 46.9	4.38	4 48.0	5	16 7 38.04	1.856	20 23 44.4	5.37	3 8.8
6	15 49 19.72	+1.266	-19 25 32.7	-4.44	4 44.6	6	16 8 22.80	+1.873	-20 25 53.5	-5.38	3 5.6
7	15 49 50.40	1.290	19 27 19.9	4.49	4 41.2	7	16 9 7.95	1.890	20 28 2.7	5.39	3 2.5
8	15 50 21.65	1.314	19 29 8.3	4.55	4 37.8	8	16 9 53.50	1.906	20 30 12.1	5.39	2 59.3
9	15 50 53.46	1.337	19 30 58.0	4.60	4 34.4	9	16 10 39.44	1.922	20 32 21.6	5.40	2 56.1
10	15 51 25.82	1.360	19 32 49.0	4.65	4 31.0	10	16 11 25.76	1.938	20 34 31.2	5.40	2 52.9
11	15 51 58.74	+1.383	-19 34 41.2	-4.70	4 27.6	11	16 12 12.45	+1.953	-20 36 40.9	-5.40	2 49.8
12	15 52 32.21	1.406	19 36 34.4	4.75	4 24.2	12	16 12 59.51	1.968	20 38 50.5	5.40	2 46.6
13	15 53 6.21	1.428	19 38 28.9	4.79	4 20.9	13	16 13 46.93	1.983	20 41 0.1	5.40	2 43.4
14	15 53 40.74	1.450	19 40 24.4	4.84	4 17.5	14	16 14 34.70	1.998	20 43 9.6	5.40	2 40.3
15	15 54 15.79	1.472	19 42 20.9	4.88	4 14.1	15	16 15 22.82	2.012	20 45 19.0	5.39	2 37.2
16	15 54 51.36	+1.493	-19 44 18.3	-4.92	4 10.8	16	16 16 11.28	+2.026	-20 47 28.3	-5.38	2 34.1
17	15 55 27.45	1.514	19 46 16.3	4.96	4 7.5	17	16 17 0.08	2.040	20 49 37.4	5.37	2 31.0
18	15 56 4.04	1.535	19 48 16.1	4.99	4 4.1	18	16 17 49.21	2.054	20 51 46.2	5.36	2 27.9
19	15 56 41.12	1.556	19 50 16.2	5.02	4 0.8	19	16 18 38.67	2.067	20 53 54.9	5.35	2 24.8
20	15 57 18.70	1.576	19 52 17.1	5.06	3 57.5	20	16 19 28.45	2.080	20 56 3.2	5.34	2 21.7
21	15 57 56.77	+1.596	-19 54 18.9	-5.09	3 54.2	21	16 20 18.54	+2.093	-20 58 11.2	-5.33	2 18.6
22	15 58 35.32	1.616	19 56 21.4	5.12	3 50.9	22	16 21 8.94	2.106	21 0 18.9	5.31	2 15.5
23	15 59 14.35	1.636	19 58 24.5	5.15	3 47.6	23	16 21 59.64	2.119	21 2 26.3	5.30	2 12.4
24	15 59 53.85	1.656	20 0 28.4	5.18	3 44.3	24	16 22 50.65	2.132	21 4 33.2	5.28	2 9.3
25	16 0 33.82	1.675	20 2 32.9	5.20	3 41.1	25	16 23 41.95	2.144	21 6 39.7	5.26	2 6.2
26	16 1 14.25	+1.694	-20 4 38.0	-5.23	3 37.8	26	16 24 33.55	+2.156	-21 8 45.8	-5.24	2 3.1
27	16 1 55.13	1.713	20 6 43.6	5.25	3 34.5	27	16 25 25.42	2.168	21 10 51.4	5.22	2 0.1
28	16 2 36.47	1.732	20 8 49.7	5.27	3 31.3	28	16 26 17.58	2.179	21 12 56.4	5.20	1 57.0
29	16 3 18.25	1.751	20 10 56.4	5.29	3 28.1	29	16 27 10.02	2.190	21 15 0.9	5.18	1 53.9
30	16 4 0.48	1.769	20 13 3.5	5.31	3 24.8	30	16 28 2.72	2.201	21 17 4.9	5.16	1 50.8
31	16 4 43.14	+1.787	-20 15 11.0	-5.32	3 21.6	31	16 28 55.68	+2.212	-21 19 8.3	-5.13	1 47.8
32	16 5 26.24	+1.805	-20 17 18.8	-5.34	3 18.4	32	16 29 48.91	+2.223	-21 21 11.1	-5.10	1 44.7
Day of the Month.						Day of the Month.					
5th.						7th.					
13th.						15th.					
21st.						23d.					
29th.						31st.					
Polar Semidiameter . .						Polar Semidiameter . .					
Horizontal Parallax . .						Horizontal Parallax . .					
17.2						15.9					
1.6						1.5					
16.8						15.7					
1.6						1.5					
16.5						15.5					
1.5						1.5					
16.2						15.3					
1.5						1.4					

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	16 29 48.91	+2.223	-21 21 11.1	-5.10	1 44.7	1	16 57 55.05	+2.425	-22 15 35.8	-3.84	0 14.7
2	16 30 42.39	2.233	21 23 13.2	5.07	1 41.7	2	16 58 53.29	2.428	22 17 7.3	3.79	0 11.8
3	16 31 36.11	2.243	21 25 14.6	5.04	1 38.7	3	16 59 51.60	2.431	22 18 37.4	3.73	0 8.9
4	16 32 30.07	2.253	21 27 15.3	5.01	1 35.7	4	17 0 49.98	2.434	22 20 6.3	3.68	0 5.9
5	16 33 24.26	2.263	21 29 15.3	4.98	1 32.6	5	17 1 48.41	2.436	22 21 33.7	3.62	0 2.9
6	16 34 18.68	+2.272	-21 31 14.5	-4.95	1 29.6	6	17 2 46.88	+2.438	-22 22 59.9	-3.56	0 0.0
7	16 35 13.31	2.281	21 33 13.0	4.92	1 26.6	7	17 3 45.40	2.439	22 24 24.7	3.51	23 54.1
8	16 36 8.16	2.290	21 35 10.6	4.89	1 23.6	8	17 4 43.95	2.440	22 25 48.1	3.45	23 51.1
9	16 37 3.22	2.298	21 37 7.4	4.85	1 20.5	9	17 5 42.53	2.441	22 27 10.2	3.39	23 48.1
10	16 37 58.48	2.306	21 39 3.2	4.81	1 17.5	10	17 6 41.13	2.442	22 28 30.8	3.33	23 45.2
11	16 38 53.93	+2.314	-21 40 58.2	-4.77	1 14.5	11	17 7 39.74	+2.443	-22 29 50.1	-3.27	23 42.3
12	16 39 49.56	2.322	21 42 52.3	4.73	1 11.5	12	17 8 38.37	2.443	22 31 7.9	3.21	23 39.3
13	16 40 45.38	2.330	21 44 45.4	4.69	1 8.5	13	17 9 37.00	2.443	22 32 24.3	3.16	23 36.3
14	16 41 41.38	2.337	21 46 37.5	4.65	1 5.5	14	17 10 35.62	2.443	22 33 39.3	3.10	23 33.4
15	16 42 37.54	2.344	21 48 28.6	4.61	1 2.5	15	17 11 34.24	2.442	22 34 52.9	3.04	23 30.5
16	16 43 33.87	+2.351	-21 50 18.7	-4.57	0 59.5	16	17 12 32.85	+2.441	-22 36 5.0	-2.98	23 27.5
17	16 44 30.36	2.357	21 52 7.8	4.53	0 56.5	17	17 13 31.43	2.440	22 37 15.7	2.92	23 24.5
18	16 45 27.01	2.363	21 53 55.8	4.48	0 53.5	18	17 14 29.99	2.439	22 38 25.0	2.86	23 21.6
19	16 46 23.80	2.369	21 55 42.7	4.44	0 50.5	19	17 15 28.52	2.438	22 39 32.8	2.80	23 18.6
20	16 47 20.74	2.375	21 57 28.5	4.39	0 47.5	20	17 16 27.02	2.437	22 40 39.1	2.74	23 15.6
21	16 48 17.81	+2.381	-21 59 13.3	-4.34	0 44.5	21	17 17 25.47	+2.435	-22 41 44.0	-2.67	23 12.6
22	16 49 15.02	2.387	22 0 56.9	4.30	0 41.5	22	17 18 23.88	2.433	22 42 47.5	2.61	23 9.7
23	16 50 12.36	2.392	22 2 39.3	4.25	0 38.5	23	17 19 22.23	2.431	22 43 49.5	2.55	23 6.7
24	16 51 9.82	2.397	22 4 20.6	4.20	0 35.6	24	17 20 20.53	2.428	22 44 50.0	2.49	23 3.7
25	16 52 7.41	2.402	22 6 0.7	4.15	0 32.6	25	17 21 18.76	2.425	22 45 49.1	2.43	23 0.7
26	16 53 5.10	+2.406	-22 7 39.7	-4.10	0 29.6	26	17 22 16.92	+2.422	-22 46 46.8	-2.37	22 57.8
27	16 54 2.90	2.410	22 9 17.4	4.05	0 26.6	27	17 23 15.00	2.418	22 47 43.0	2.31	22 54.9
28	16 55 0.80	2.414	22 10 53.9	4.00	0 23.7	28	17 24 13.00	2.414	22 48 37.7	2.25	22 51.9
29	16 55 58.80	2.418	22 12 29.1	3.95	0 20.7	29	17 25 10.90	2.410	22 49 31.0	2.19	22 48.9
30	5 56 56.88	2.422	22 14 3.1	3.89	0 17.7	30	17 26 8.71	2.406	22 50 22.9	2.13	22 46.0
31	16 57 55.05	+2.425	-22 15 35.8	-3.84	0 14.7	31	17 27 6.41	+2.402	-22 51 13.2	-2.07	22 43.0
32	16 58 53.29	+2.428	-22 17 7.3	-3.79	0 11.8	32	17 28 4.00	+2.397	-22 52 2.2	-2.01	22 40.0
Day of the Month.						Day of the Month.					
8th.						2d.					
16th.						10th.					
24th.						18th.					
32d.						26th.					
						34th.					
Polar Semidiameter . .						Polar Semidiameter . .					
Horizontal Parallax . .						Horizontal Parallax . .					
15.2						15.0					
1.4						1.4					
15.1						15.0					
1.4						1.4					
15.0						15.0					
1.4						1.4					
15.0						15.1					
1.4						1.4					
15.0						15.2					
1.4						1.4					

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	8 29 7.67	-0.723	+19 31 1.2	+2.87	13 44.4	1	8 19 1.44	-0.829	+20 8 57.4	+2.97	11 32.4
2	8 28 50.18	0.734	19 32 10.5	2.90	13 40.2	2	8 18 41.59	0.825	20 10 8.3	2.94	11 28.2
3	8 28 32.45	0.744	19 33 20.5	2.93	13 35.9	3	8 18 21.84	0.820	20 11 18.6	2.92	11 23.9
4	8 28 14.49	0.753	19 34 31.1	2.95	13 31.7	4	8 18 2.21	0.815	20 12 28.3	2.89	11 19.6
5	8 27 56.31	0.762	19 35 42.3	2.98	13 27.5	5	8 17 42.71	0.810	20 13 37.4	2.86	11 15.4
6	8 27 37.90	-0.771	+19 36 54.1	+3.00	13 23.2	6	8 17 23.35	-0.804	+20 14 45.8	+2.83	11 11.1
7	8 27 19.30	0.779	19 38 6.4	3.02	13 19.0	7	8 17 4.14	0.797	20 15 53.5	2.81	11 6.9
8	8 27 0.51	0.787	19 39 19.2	3.04	13 14.8	8	8 16 45.10	0.790	20 17 0.4	2.77	11 2.6
9	8 26 41.53	0.794	19 40 32.5	3.06	13 10.5	9	8 16 26.23	0.782	20 18 6.5	2.74	10 58.4
10	8 26 22.38	0.801	19 41 46.1	3.07	13 6.3	10	8 16 7.54	0.774	20 19 11.8	2.70	10 54.2
11	8 26 3.06	-0.808	+19 43 0.1	+3.09	13 2.0	11	8 15 49.06	-0.766	+20 20 16.3	+2.67	10 49.9
12	8 25 43.60	0.814	19 44 14.3	3.10	12 57.7	12	8 15 30.78	0.757	20 21 19.9	2.63	10 45.7
13	8 25 24.01	0.819	19 45 28.8	3.11	12 53.5	13	8 15 12.72	0.748	20 22 22.5	2.59	10 41.5
14	8 25 4.28	0.824	19 46 43.6	3.12	12 49.2	14	8 14 54.89	0.738	20 23 24.2	2.55	10 37.2
15	8 24 44.44	0.829	19 47 58.5	3.12	12 44.9	15	8 14 37.30	0.728	20 24 25.0	2.51	10 33.0
16	8 24 24.50	-0.833	+19 49 13.5	+3.13	12 40.7	16	8 14 19.96	-0.717	+20 25 24.8	+2.47	10 28.8
17	8 24 4.47	0.836	19 50 28.6	3.13	12 36.4	17	8 14 2.89	0.706	20 26 23.5	2.43	10 24.6
18	8 23 44.36	0.839	19 51 43.8	3.13	12 32.1	18	8 13 46.08	0.694	20 27 21.3	2.38	10 20.4
19	8 23 24.19	0.842	19 52 59.0	3.13	12 27.9	19	8 13 29.56	0.682	20 28 17.9	2.34	10 16.2
20	8 23 3.97	0.843	19 54 14.1	3.13	12 23.6	20	8 13 13.32	0.670	20 29 13.5	2.29	10 12.0
21	8 22 43.71	-0.845	+19 55 29.2	+3.12	12 19.3	21	8 12 57.38	-0.658	+20 30 8.0	+2.25	10 7.8
22	8 22 23.42	0.846	19 56 44.1	3.12	12 15.1	22	8 12 41.74	0.645	20 31 1.3	2.20	10 3.6
23	8 22 3.11	0.846	19 57 58.8	3.11	12 10.8	23	8 12 26.42	0.632	20 31 53.6	2.15	9 59.4
24	8 21 42.79	0.846	19 59 13.3	3.10	12 6.6	24	8 12 11.42	0.618	20 32 44.6	2.10	9 55.2
25	8 21 22.48	0.846	20 0 27.6	3.09	12 2.3	25	8 11 56.74	0.605	20 33 34.5	2.05	9 51.1
26	8 21 2.19	-0.845	+20 1 41.6	+3.08	11 58.0	26	8 11 42.39	-0.591	+20 34 23.2	+2.00	9 46.9
27	8 20 41.93	0.843	20 2 55.3	3.06	11 53.7	27	8 11 28.39	0.576	20 35 10.6	1.95	9 42.7
28	8 20 21.71	0.841	20 4 8.6	3.05	11 49.5	28	8 11 14.74	0.562	20 35 56.8	1.90	9 38.6
29	8 20 1.54	0.839	20 5 21.5	3.03	11 45.2	29	8 11 1.44	0.547	20 36 41.8	.85	9 34.4
30	8 19 41.43	0.836	20 6 33.9	3.01	11 40.9	30	8 10 48.50	0.531	20 37 25.5	.79	9 30.3
31	8 19 21.39	-0.833	+20 7 45.9	+2.99	11 36.7	31	8 10 35.93	-0.516	+20 38 7.9	+1.74	9 26.1
32	8 19 1.44	-0.829	+20 8 57.4	+2.97	11 32.4	32	8 10 23.73	-0.500	+20 38 49.1	+1.69	9 22.0
Day of the Month.	1st.	2d.	17th.	25th.		Day of the Month.	2d.	10th.	18th.	26th.	
Polar Semidiameter . .	9".6	9".6	9".6	9".6		Polar Semidiameter . .	9".6	9".6	9".5	9".4	
Horizontal Parallax . .	1.1	1.1	1.1	1.1		Horizontal Parallax . .	1.1	1.1	1.1	1.1	

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

## GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	8 10 48.50	-0.531	+20 37 25.5	+1.79	9 30.3	1	8 7 33.85	+0.097	+20 48 46.5	+0.01	7 25.2
2	8 10 35.93	0.516	20 38 7.9	1.74	9 26.1	2	8 7 34.73	0.046	20 48 45.9	-0.05	7 21.3
3	8 10 23.73	0.500	20 38 49.1	1.69	9 22.0	3	8 7 36.07	0.065	20 48 43.9	0.11	7 17.4
4	8 10 11.91	0.484	20 39 29.0	1.63	9 17.9	4	8 7 37.87	0.084	20 48 40.6	0.17	7 13.5
5	8 10 0.48	0.468	20 40 7.6	1.58	9 13.7	5	8 7 40.13	0.103	20 48 35.8	0.23	7 9.6
6	8 9 49.44	-0.452	+20 40 44.9	+1.52	9 9.6	6	8 7 42.84	+0.123	+20 48 29.6	-0.29	7 5.7
7	8 9 38.80	0.435	20 41 20.8	1.47	9 5.5	7	8 7 46.02	0.142	20 48 21.9	0.35	7 1.9
8	8 9 28.56	0.418	20 41 55.4	1.41	9 1.4	8	8 7 49.65	0.161	20 48 12.9	0.41	6 58.0
9	8 9 18.73	0.401	20 42 28.6	1.36	8 57.3	9	8 7 53.73	0.180	20 48 2.5	0.47	6 54.1
10	8 9 9.32	0.384	20 43 0.5	1.30	8 53.3	10	8 7 58.28	0.199	20 47 50.7	0.52	6 50.3
11	8 9 0.32	-0.366	+20 43 31.0	+1.24	8 49.2	11	8 8 3.27	+0.218	+20 47 37.4	-0.58	6 46.4
12	8 8 51.75	0.348	20 44 0.1	1.18	8 45.1	12	8 8 8.72	0.237	20 47 22.8	0.64	6 42.6
13	8 8 43.61	0.330	20 44 27.8	1.13	8 41.1	13	8 8 14.62	0.255	20 47 6.8	0.70	6 38.8
14	8 8 35.90	0.312	20 44 54.1	1.07	8 37.0	14	8 8 20.97	0.274	20 46 49.4	0.76	6 34.9
15	8 8 28.63	0.294	20 45 19.1	1.01	8 33.0	15	8 8 27.77	0.293	20 46 30.6	0.82	6 31.1
16	8 8 21.80	-0.275	+20 45 42.6	+0.95	8 28.9	16	8 8 35.00	+0.311	+20 46 10.5	-0.87	6 27.3
17	8 8 15.41	0.257	20 46 4.7	0.89	8 24.9	17	8 8 42.68	0.329	20 45 49.0	0.92	6 23.5
18	8 8 9.47	0.238	20 46 25.4	0.83	8 20.8	18	8 8 50.80	0.347	20 45 26.1	0.98	6 19.7
19	8 8 3.97	0.220	20 46 44.7	0.78	8 16.8	19	8 8 59.35	0.365	20 45 1.9	1.04	6 15.9
20	8 7 58.93	0.201	20 47 2.6	0.72	8 12.8	20	8 9 8.33	0.383	20 44 36.3	1.10	6 12.1
21	8 7 54.33	-0.182	+20 47 19.1	+0.66	8 8.8	21	8 9 17.73	+0.401	+20 44 9.3	-1.16	6 8.4
22	8 7 50.19	0.163	20 47 34.1	0.60	8 4.8	22	8 9 27.57	0.419	20 43 41.1	1.21	6 4.6
23	8 7 46.50	0.144	20 47 47.7	0.54	8 0.8	23	8 9 37.83	0.436	20 43 11.5	1.27	6 0.9
24	8 7 43.27	0.125	20 47 59.9	0.48	7 56.8	24	8 9 48.50	0.453	20 42 40.5	1.32	5 57.1
25	8 7 40.49	0.106	20 48 10.7	0.42	7 52.9	25	8 9 59.58	0.470	20 42 8.3	1.38	5 53.4
26	8 7 38.17	-0.087	+20 48 20.1	+0.36	7 48.9	26	8 10 11.07	+0.487	+20 41 34.7	-1.43	5 49.6
27	8 7 36.31	0.068	20 48 28.0	0.30	7 44.9	27	8 10 22.98	0.505	20 40 59.8	1.48	5 45.9
28	8 7 34.90	0.049	20 48 34.5	0.24	7 41.0	28	8 10 35.28	0.521	20 40 23.6	1.54	5 42.2
29	8 7 33.95	0.030	20 48 39.6	0.18	7 37.0	29	8 10 47.99	0.538	20 39 46.2	1.59	5 38.4
30	8 7 33.46	-0.011	20 48 43.3	0.12	7 33.1	30	8 11 1.10	0.554	20 39 7.4	1.65	5 34.7
31	8 7 33.42	+0.006	+20 48 45.6	+0.07	7 29.2	31	8 11 14.60	+0.571	+20 38 27.3	-1.70	5 31.0
32	8 7 33.85	+0.027	+20 48 46.5	+0.01	7 25.2	32	8 11 28.50	+0.587	+20 37 46.0	-1.75	5 27.3
Day of the Month.						Day of the Month.					
Polar Semidiameter . .						Polar Semidiameter . .					
Horizontal Parallax . .						Horizontal Parallax . .					



**GREENWICH MEAN TIME.**

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.	h m	Noon.	Noon.	Noon.	Noon.	Noon.	h m
1	h m s 8 11 14.60	s +0.571	° ' " 20 38 27.3	" -1.70	5 31.0	1	h m s 8 21 8.06	s +0.995	° ' " 20 7 41.9	" -3.21	3 39.0
2	8 11 28.50	0.587	20 37 46.0	1.75	5 27.3	2	8 21 32.07	1.006	20 6 24.2	3.26	3 35.4
3	8 11 42.78	0.603	20 37 3.4	1.81	5 23.6	3	8 21 56.34	1.016	20 5 5.5	3.30	3 31.9
4	8 11 57.45	0.619	20 36 19.5	1.86	5 19.9	4	8 22 20.86	1.027	20 3 45.8	3.35	3 28.4
5	8 12 12.50	0.635	20 35 34.3	1.91	5 16.2	5	8 22 45.63	1.037	20 2 25.0	3.39	3 24.9
6	8 12 27.93	+0.651	+20 34 47.9	-1.96	5 12.5	6	8 23 10.64	+1.047	+20 1 3.2	-3.43	3 21.4
7	8 12 43.73	0.666	20 34 0.2	2.01	5 8.9	7	8 23 35.89	1.057	19 59 40.4	3.47	3 17.9
8	8 12 59.91	0.699	20 33 11.2	2.07	5 5.3	8	8 24 1.38	1.067	19 58 16.6	3.51	3 14.4
9	8 13 16.46	0.697	20 32 21.0	2.19	5 1.6	9	8 24 27.11	1.077	19 56 51.8	3.55	3 10.9
10	8 13 33.37	0.719	20 31 29.6	2.17	4 58.0	10	8 24 53.05	1.088	19 55 26.0	3.59	3 7.4
11	8 13 50.63	+0.737	+20 30 37.0	-2.22	4 54.3	11	8 25 19.21	+1.095	+19 53 59.3	-3.63	3 3.9
12	8 14 8.25	0.741	20 29 43.2	2.27	4 50.7	12	8 25 45.59	1.103	19 52 31.6	3.67	3 0.4
13	8 14 26.23	0.756	20 28 48.1	2.32	4 47.0	13	8 26 12.18	1.112	19 51 3.0	3.71	2 56.9
14	8 14 44.55	0.770	20 27 51.8	2.37	4 43.4	14	8 26 38.98	1.121	19 49 33.4	3.75	2 53.4
15	8 15 3.21	0.785	20 26 54.3	2.42	4 39.8	15	8 27 5.97	1.129	19 48 2.9	3.79	2 49.9
16	8 15 22.21	+0.799	+20 25 55.6	-2.47	4 36.2	16	8 27 33.16	+1.137	+19 46 31.4	-3.83	2 46.4
17	8 15 41.54	0.812	20 24 55.8	2.52	4 32.6	17	8 28 0.54	1.145	19 44 59.0	3.87	2 42.9
18	8 16 1.19	0.826	20 23 54.8	2.57	4 29.0	18	8 28 28.11	1.152	19 43 25.8	3.91	2 39.4
19	8 16 21.17	0.839	20 22 52.6	2.59	4 25.4	19	8 28 55.85	1.159	19 41 51.7	3.95	2 36.0
20	8 16 41.46	0.852	20 21 49.2	2.67	4 21.8	20	8 29 23.77	1.167	19 40 16.7	3.98	2 32.5
21	8 17 2.07	+0.865	+20 20 44.7	-2.72	4 18.2	21	8 29 51.86	+1.174	+19 38 40.9	-4.01	2 29.1
22	8 17 22.98	0.878	20 19 39.1	2.76	4 14.6	22	8 30 20.12	1.181	19 37 4.2	4.05	2 25.6
23	8 17 44.20	0.890	20 18 32.4	2.81	4 11.0	23	8 30 48.54	1.188	19 35 26.6	4.08	2 22.1
24	8 18 5.72	0.903	20 17 24.5	2.85	4 7.4	24	8 31 17.12	1.195	19 33 48.2	4.12	2 18.6
25	8 18 27.53	0.915	20 16 15.5	2.90	4 3.8	25	8 31 45.86	1.201	19 32 9.1	4.15	2 15.2
26	8 18 49.62	+0.927	+20 15 5.4	-2.94	4 0.3	26	8 32 14.74	+1.207	+19 30 29.1	-4.18	2 11.7
27	8 19 12.00	0.938	20 13 54.1	2.99	3 56.7	27	8 32 43.77	1.213	19 28 48.3	4.22	2 8.3
28	8 19 34.67	0.950	20 12 41.9	3.04	3 53.2	28	8 33 12.95	1.218	19 27 6.7	4.25	2 4.8
29	8 19 57.61	0.969	20 11 28.5	3.08	3 49.6	29	8 33 42.26	1.224	19 25 24.4	4.28	2 1.4
30	8 20 20.83	0.973	20 10 14.0	3.12	3 46.1	30	8 34 11.71	1.230	19 23 41.3	4.31	1 57.9
31	8 20 44.31	+0.984	+20 8 58.5	-3.17	3 42.5	31	8 34 41.29	+1.235	+19 21 57.4	-4.34	1 54.5
32	8 21 8.06	+0.995	+20 7 41.9	-3.21	3 39.0	32	8 35 10.99	+1.240	+19 20 12.8	-4.37	1 51.1
Day of the Month.						Day of the Month.					
8th.						1st.					
16th.						9th.					
24th.						17th.					
32d.						25th.					
Polar Semidiameter . .						Polar Semidiameter . .					
Horizontal Parallax . .						Horizontal Parallax . .					
8.3						6.0					
8.2						6.0					
8.1						7.9					
8.0						7.8					
1.0						0.9					
0.9						0.9					

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>h</sup> <sup>m</sup>
1	8 34 41.29	+1.935	+19 21 57.4	-4.34	1 54.5	1	8 50 38.60	+1.310	+18 23 21.5	-5.00	0 8.5
2	8 35 10.99	1.940	19 20 12.8	4.37	1 51.1	2	8 51 10.02	1.309	18 21 21.2	5.01	0 5.1
3	8 35 40.82	1.945	19 18 27.5	4.40	1 47.7	3	8 51 41.43	1.309	18 19 20.7	5.02	0 1.7
4	8 36 10.77	1.950	19 16 41.5	4.43	1 44.2	4	8 52 12.83	1.308	18 17 19.9	5.03	23 54.9
5	8 36 40.83	1.955	19 14 54.7	4.46	1 40.8	5	8 52 44.21	1.307	18 15 18.9	5.04	23 51.5
6	8 37 11.00	+1.959	+19 13 7.3	-4.49	1 37.3	6	8 53 15.57	+1.306	+18 13 17.7	-5.05	23 48.1
7	8 37 41.27	1.963	19 11 19.2	4.52	1 33.9	7	8 53 46.89	1.305	18 11 16.3	5.06	23 44.6
8	8 38 11.64	1.967	19 9 30.5	4.55	1 30.4	8	8 54 18.18	1.303	18 9 14.8	5.07	23 41.2
9	8 38 42.11	1.971	19 7 41.1	4.57	1 27.0	9	8 54 49.43	1.301	18 7 13.1	5.07	23 37.8
10	8 39 12.66	1.975	19 5 51.0	4.60	1 23.6	10	8 55 20.64	1.299	18 5 11.3	5.08	23 34.4
11	8 39 43.31	+1.979	+19 4 0.4	-4.63	1 20.2	11	8 55 51.79	+1.297	+18 3 9.4	-5.08	23 30.9
12	8 40 14.03	1.982	19 2 9.1	4.65	1 16.8	12	8 56 22.90	1.295	18 1 7.5	5.08	23 27.5
13	8 40 44.83	1.985	19 0 17.3	4.67	1 13.4	13	8 56 53.96	1.292	17 59 5.5	5.08	23 24.1
14	8 41 15.69	1.988	18 58 24.9	4.70	1 10.0	14	8 57 24.94	1.290	17 57 3.5	5.08	23 20.7
15	8 41 46.63	1.990	18 56 31.9	4.72	1 6.6	15	8 57 55.86	1.287	17 55 1.4	5.08	23 17.3
16	8 42 17.63	+1.993	+18 54 38.4	-4.74	1 3.1	16	8 58 26.71	+1.284	+17 52 59.4	-5.08	23 13.9
17	8 42 48.68	1.995	18 52 44.4	4.76	0 59.7	17	8 58 57.49	1.281	17 50 57.4	5.08	23 10.5
18	8 43 19.79	1.997	18 50 49.8	4.78	0 56.3	18	8 59 28.19	1.277	17 48 55.4	5.08	23 7.1
19	8 43 50.95	1.999	18 48 54.8	4.80	0 52.9	19	8 59 58.80	1.274	17 46 53.5	5.08	23 3.6
20	8 44 22.15	1.301	18 46 59.3	4.82	0 49.4	20	9 0 29.34	1.271	17 44 51.7	5.07	23 0.2
21	8 44 53.39	+1.302	+18 45 3.3	-4.84	0 46.0	21	9 0 59.79	+1.267	+17 42 50.0	-5.07	22 56.8
22	8 45 24.66	1.304	18 43 6.9	4.86	0 42.6	22	9 1 30.14	1.263	17 40 48.4	5.06	22 53.4
23	8 45 55.97	1.305	18 41 10.1	4.88	0 39.2	23	9 2 0.39	1.259	17 38 47.0	5.06	22 49.9
24	8 46 27.31	1.306	18 39 12.8	4.89	0 35.7	24	9 2 30.55	1.254	17 36 45.8	5.05	22 46.5
25	8 46 58.67	1.307	18 37 15.1	4.91	0 32.3	25	9 3 0.60	1.250	17 34 44.7	5.04	22 43.1
26	8 47 30.05	+1.308	+18 35 17.1	-4.92	0 28.9	26	9 3 30.54	+1.245	+17 32 43.9	-5.03	22 39.7
27	8 48 1.46	1.309	18 33 18.7	4.94	0 25.5	27	9 4 0.37	1.241	17 30 43.3	5.02	22 36.2
28	8 48 32.88	1.309	18 31 19.9	4.95	0 22.1	28	9 4 30.08	1.236	17 28 43.0	5.01	22 32.8
29	8 49 4.30	1.309	18 29 20.8	4.96	0 18.7	29	9 4 59.68	1.230	17 26 42.9	5.00	22 29.3
30	8 49 35.73	1.310	18 27 21.4	4.97	0 15.3	30	9 5 29.14	1.225	17 24 43.1	4.98	22 25.9
31	8 50 7.17	+1.310	+18 25 21.6	-4.98	0 11.9	31	9 5 58.48	+1.220	+17 22 43.7	-4.97	22 22.4
32	8 50 38.60	+1.310	+18 23 21.5	-5.00	0 8.5	32	9 6 27.69	+1.214	+17 20 44.5	-4.96	22 19.0
Day of the Month.	3d.	11th.	19th.	27th.		Day of the Month.	4th.	12th.	20th.	28th.	
Polar Semidiameter . .	7.8	7.7	7.7	7.7		Polar Semidiameter . .	7.7	7.7	7.7	7.8	
Horizontal Parallax . .	0.9	0.9	0.9	0.9		Horizontal Parallax . .	0.9	0.9	0.9	0.9	

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			h m s	s	° ' "	"	
1	9 6 27.69	+1.214	+17 20 44.5	-4.96	22 19.0	1	9 19 39.47	+0.959	+16 25 56.3	-4.03	20 34.1
2	9 6 56.76	1.208	17 18 45.8	4.94	22 15.5	2	9 20 2.36	0.948	16 24 20.3	3.98	20 30.5
3	9 7 25.69	1.202	17 16 47.5	4.93	22 12.1	3	9 20 24.97	0.937	16 22 45.4	3.93	20 27.0
4	9 7 54.46	1.196	17 14 49.6	4.91	22 8.6	4	9 20 47.31	0.926	16 21 11.7	3.88	20 23.4
5	9 8 23.08	1.189	17 12 52.1	4.89	22 5.2	5	9 21 9.36	0.913	16 19 39.3	3.83	20 19.8
6	9 8 51.55	+1.183	+17 10 55.1	-4.87	22 1.7	6	9 21 31.12	+0.901	+16 18 8.1	-3.78	20 16.2
7	9 9 19.85	1.176	17 8 58.6	4.85	21 58.2	7	9 21 52.60	0.888	16 16 38.1	3.73	20 12.6
8	9 9 47.99	1.169	17 7 2.6	4.83	21 54.7	8	9 22 13.78	0.876	16 15 9.5	3.67	20 9.0
9	9 10 15.96	1.162	17 5 7.2	4.80	21 51.3	9	9 22 34.66	0.863	16 13 42.2	3.61	20 5.4
10	9 10 43.75	1.154	17 3 12.3	4.78	21 47.8	10	9 22 55.23	0.851	16 12 16.2	3.56	20 1.8
11	9 11 11.35	+1.146	+17 1 18.1	-4.75	21 44.3	11	9 23 15.50	+0.838	+16 10 51.5	-3.50	19 58.2
12	9 11 38.77	1.139	16 59 24.5	4.73	21 40.8	12	9 23 35.45	0.825	16 9 28.3	3.44	19 54.6
13	9 12 6.01	1.131	16 57 31.5	4.70	21 37.4	13	9 23 55.09	0.811	16 8 6.5	3.38	19 51.0
14	9 12 33.06	1.123	16 55 39.1	4.67	21 33.9	14	9 24 14.40	0.798	16 6 46.1	3.32	19 47.4
15	9 12 59.90	1.114	16 53 47.5	4.64	21 30.4	15	9 24 33.40	0.784	16 5 27.2	3.26	19 43.8
16	9 13 26.54	+1.106	+16 51 56.7	-4.61	21 26.9	16	9 24 52.07	+0.771	+16 4 9.8	-3.20	19 40.2
17	9 13 52.99	1.097	16 50 6.5	4.58	21 23.4	17	9 25 10.40	0.757	16 2 53.9	3.13	19 36.6
18	9 14 19.22	1.089	16 48 17.1	4.55	21 19.9	18	9 25 28.41	0.743	16 1 39.5	3.07	19 32.9
19	9 14 45.24	1.080	16 46 28.5	4.51	21 16.4	19	9 25 46.08	0.729	16 0 26.7	3.00	19 29.3
20	9 15 11.04	1.070	16 44 40.8	4.48	21 12.9	20	9 26 3.41	0.715	15 59 15.4	2.94	19 25.6
21	9 15 36.63	+1.061	+16 42 53.8	-4.44	21 9.4	21	9 26 20.39	+0.700	+15 58 5.8	-2.87	19 22.0
22	9 16 1.99	1.052	16 41 7.7	4.41	21 5.9	22	9 26 37.02	0.686	15 56 57.7	2.80	19 18.3
23	9 16 27.12	1.043	16 39 22.6	4.37	21 2.4	23	9 26 53.31	0.671	15 55 51.3	2.73	19 14.7
24	9 16 52.02	1.033	16 37 38.3	4.33	20 58.8	24	9 27 9.24	0.656	15 54 46.6	2.66	19 11.0
25	9 17 16.69	1.023	16 35 55.0	4.29	20 55.3	25	9 27 24.81	0.641	15 53 43.6	2.59	19 7.3
26	9 17 41.12	+1.013	+16 34 12.6	-4.25	20 51.8	26	9 27 40.01	+0.626	+15 52 42.3	-2.52	19 3.6
27	9 18 5.29	1.002	16 32 31.3	4.21	20 48.3	27	9 27 54.85	0.611	15 51 42.7	2.45	18 59.9
28	9 18 29.22	0.992	16 30 50.9	4.17	20 44.7	28	9 28 9.31	0.595	15 50 44.9	2.38	18 56.2
29	9 18 52.90	0.981	16 29 11.6	4.13	20 41.2	29	9 28 23.40	0.579	15 49 48.9	2.30	18 52.5
30	9 19 16.32	0.970	16 27 33.4	4.08	20 37.6	30	9 28 37.10	0.563	15 48 54.7	2.23	18 48.8
31	9 19 39.47	+0.959	+16 25 56.3	-4.03	20 34.1	31	9 28 50.43	+0.547	+15 48 2.3	-2.15	18 45.1
32	9 20 2.36	+0.948	+16 24 20.3	-3.98	20 30.5	32	9 29 3.37	+0.531	+15 47 11.8	-2.07	18 41.3
Day of the Month.						Day of the Month.					
5th.						7th.					
13th.						15th.					
21st.						23d.					
29th.						31st.					
Polar Semidiameter . .						Polar Semidiameter . .					
Horizontal Parallax . .						Horizontal Parallax . .					
7.8						6.1					
0.9						0.9					
7.9						6.2					
0.9						0.9					
7.9						6.3					
0.9						0.9					
8.0						6.4					
0.9						0.9					

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.						
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.		
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m	
1	9 29 3.37	+0.531	+15 47 11.8	-0.07	18 41.3	1	9 32 18.24	-0.001	+15 37 34.3	+0.52	16 46.5	
2	9 29 15.91	0.514	15 46 23.2	1.99	18 37.6	2	9 32 17.99	0.020	15 37 47.9	0.61	16 42.5	
3	9 29 28.06	0.498	15 45 36.4	1.91	18 33.9	3	9 32 17.30	0.038	15 38 3.7	0.70	16 38.6	
4	9 29 39.82	0.481	15 44 51.6	1.83	18 30.1	4	9 32 16.16	0.057	15 38 21.6	0.79	16 34.6	
5	9 29 51.17	0.465	15 44 8.7	1.75	18 26.4	5	9 32 14.58	0.075	15 38 41.6	0.88	16 30.6	
6	9 30 2.12	+0.448	+15 43 27.8	-1.67	18 22.6	6	9 32 12.55	-0.094	+15 39 3.8	+0.97	16 26.7	
7	9 30 12.66	0.431	15 42 48.8	1.59	18 18.9	7	9 32 10.08	0.112	15 39 28.2	1.06	16 22.7	
8	9 30 22.79	0.413	15 42 11.8	1.50	18 15.1	8	9 32 7.18	0.130	15 39 54.6	1.15	16 18.7	
9	9 30 32.51	0.396	15 41 36.8	1.42	18 11.3	9	9 32 3.83	0.148	15 40 23.2	1.24	16 14.7	
10	9 30 41.81	0.379	15 41 3.8	1.34	18 7.5	10	9 32 0.05	0.167	15 40 53.8	1.33	16 10.7	
11	9 30 50.70	+0.361	+15 40 32.9	-1.25	18 3.7	11	9 31 55.83	-0.185	+15 41 26.5	+1.41	16 6.7	
12	9 30 59.16	0.344	15 40 4.0	1.17	17 59.9	12	9 31 51.18	0.203	15 42 1.3	1.50	16 2.7	
13	9 31 7.21	0.327	15 39 37.1	1.08	17 56.1	13	9 31 46.11	0.220	15 42 38.1	1.58	15 58.7	
14	9 31 14.83	0.309	15 39 12.3	1.00	17 52.3	14	9 31 40.61	0.238	15 43 16.9	1.67	15 54.6	
15	9 31 22.03	0.291	15 38 49.6	0.91	17 48.5	15	9 31 34.68	0.256	15 43 57.8	1.75	15 50.6	
16	9 31 28.81	+0.273	+15 38 28.9	-0.82	17 44.7	16	9 31 28.33	-0.273	+15 44 40.6	+1.83	15 46.6	
17	9 31 35.16	0.255	15 38 10.4	0.73	17 40.9	17	9 31 21.57	0.290	15 45 25.4	1.91	15 42.5	
18	9 31 41.08	0.238	15 37 53.9	0.64	17 37.0	18	9 31 14.39	0.308	15 46 12.1	1.99	15 38.5	
19	9 31 46.56	0.220	15 37 39.6	0.56	17 33.2	19	9 31 6.80	0.325	15 47 0.8	2.07	15 34.4	
20	9 31 51.62	0.202	15 37 27.3	0.47	17 29.3	20	9 30 58.80	0.342	15 47 51.3	2.15	15 30.3	
21	9 31 56.24	+0.183	+15 37 17.2	-0.38	17 25.5	21	9 30 50.40	-0.358	+15 48 43.8	+2.23	15 26.3	
22	9 32 0.43	0.165	15 37 9.2	0.29	17 21.6	22	9 30 41.60	0.375	15 49 38.1	2.31	15 22.2	
23	9 32 4.18	0.147	15 37 3.4	0.20	17 17.7	23	9 30 32.40	0.392	15 50 34.2	2.38	15 18.1	
24	9 32 7.49	0.129	15 36 59.7	0.11	17 13.8	24	9 30 22.80	0.408	15 51 32.1	2.45	15 14.0	
25	9 32 10.36	0.110	15 36 58.1	-0.02	17 9.9	25	9 30 12.82	0.424	15 52 31.8	2.52	15 9.9	
26	9 32 12.78	+0.092	+15 36 58.8	+0.07	17 6.0	26	9 30 2.45	-0.440	+15 53 33.2	+2.59	15 5.8	
27	9 32 14.76	0.073	15 37 1.6	0.16	17 2.1	27	9 29 51.69	0.456	15 54 36.3	2.66	15 1.7	
28	9 32 16.30	0.055	15 37 6.5	0.25	16 58.2	28	9 29 40.57	0.471	15 55 41.1	2.73	14 57.6	
29	9 32 17.39	0.036	15 37 13.6	0.34	16 54.3	29	9 29 29.07	0.486	15 56 47.6	2.80	14 53.4	
30	9 32 18.04	+0.018	15 37 22.9	0.43	16 50.4	30	9 29 17.20	0.502	15 57 55.7	2.87	14 49.3	
31	9 32 18.24	-0.001	+15 37 34.3	+0.52	16 46.5	31	9 29 4.98	-0.517	+15 59 5.4	+2.93	14 45.2	
32	9 32 17.99	-0.020	+15 37 47.9	+0.61	16 42.5	32	9 28 52.41	-0.531	+16 0 10.6	+3.00	14 41.0	
Day of the Month.		8th.	16th.	24th.	32d.	Day of the Month.		2d.	10th.	18th.	26th.	34th.
Polar Semidiameter . .		8".5	8".7	8".8	8".9	Polar Semidiameter . .		8".9	9".0	9".2	9".3	9".4
Horizontal Parallax . .		1.0	1.0	1.0	1.0	Horizontal Parallax . .		1.0	1.0	1.0	1.0	1.1

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign - indicates that north declinations are decreasing and south declinations increasing.

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. of R. A. for 1 Day.	Apparent Declination.	Var. of Decl. for 1 Day.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. of R. A. for 1 Day.	Apparent Declination.	Var. of Decl. for 1 Day.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
Jan. 1	13 3 53.35	+4.987	-6 5 24.1	-24.43	18 18.6	July 3	12 49 34.73	+2.506	-4 36 47.8	-18.49	6 0.8
5	13 4 8.87	3.473	6 6 51.7	19.36	18 3.1	7	12 49 46.30	3.980	4 38 11.5	23.36	5 45.3
9	13 4 21.11	2.649	6 7 58.8	14.21	17 47.6	11	12 50 0.95	4.045	4 39 54.5	28.14	5 29.8
13	13 4 30.00	1.801	6 8 45.3	9.09	17 32.0	15	12 50 18.64	4.798	4 41 56.4	32.88	5 14.4
17	13 4 35.51	0.956	6 9 10.9	-3.81	17 16.4	19	12 50 39.29	5.527	4 44 16.8	37.36	4 59.0
21	13 4 37.65	+0.114	-6 9 15.7	+1.37	17 0.6	23	12 51 2.83	+6.938	-4 46 55.2	-41.77	4 43.7
25	13 4 36.44	-0.718	6 9 0.0	6.48	16 44.9	27	12 51 29.17	6.999	4 49 50.8	46.03	4 28.4
29	13 4 31.92	1.538	6 8 24.0	11.49	16 29.1	31	12 51 58.24	7.601	4 53 3.3	50.15	4 13.2
Feb. 2	13 4 24.15	2.346	6 7 28.2	16.41	16 13.2	Aug. 4	12 52 29.95	8.252	4 56 31.9	54.13	3 58.0
6	13 4 13.18	3.137	6 6 12.8	21.23	15 57.3	8	12 53 4.22	8.878	5 0 16.1	57.83	3 42.8
10	13 3 59.08	-3.905	-6 4 38.5	+25.89	15 41.3	12	12 53 40.93	+9.472	-5 4 15.1	-61.53	3 27.7
14	13 3 41.97	4.642	6 2 45.9	30.37	15 25.3	16	12 54 19.96	10.033	5 8 28.1	64.20	3 12.6
18	13 3 21.99	5.348	6 0 35.9	34.59	15 9.3	20	12 55 1.15	10.580	5 12 54.0	68.04	2 57.6
22	13 2 59.30	5.997	5 58 9.5	38.56	14 53.1	24	12 55 44.40	11.056	5 17 32.1	70.97	2 42.6
26	13 2 34.08	6.607	5 55 27.8	42.23	14 37.0	28	12 56 29.56	11.581	5 22 21.5	73.68	2 27.6
Mar. 1	13 2 6.50	-7.173	-5 52 32.0	+45.62	14 20.8	Sept. 1	12 57 16.52	11.954	-5 27 21.3	-78.18	2 12.6
5	13 1 36.76	7.680	5 49 23.2	48.70	14 4.5	5	12 58 5.15	12.351	5 32 30.6	78.44	1 57.7
9	13 1 5.05	8.153	5 46 2.8	51.45	13 48.3	9	12 58 55.28	12.707	5 37 48.5	80.44	1 42.8
13	13 0 31.62	8.555	5 42 32.1	53.83	13 32.0	13	12 59 46.75	13.090	5 43 13.8	82.17	1 27.9
17	12 59 56.70	8.891	5 38 52.7	55.80	13 15.7	17	13 0 39.38	13.922	5 48 45.5	83.62	1 13.1
21	12 59 20.58	-9.160	-5 35 6.3	+57.35	12 59.4	21	13 1 33.03	13.526	-5 54 22.4	-84.63	0 58.2
25	12 58 43.51	9.364	5 31 14.5	58.49	12 43.1	25	13 2 27.54	13.722	6 0 3.7	85.78	0 43.4
29	12 58 5.75	9.504	5 27 19.0	59.22	12 26.7	29	13 3 22.76	13.878	6 5 48.3	86.48	0 28.6
Apr. 2	12 57 27.56	9.580	5 23 21.3	59.56	12 10.3	Oct. 3	13 4 18.51	13.922	6 11 35.2	86.92	0 13.8
6	12 56 49.19	9.591	5 19 23.1	59.49	11 54.0	7	13 5 14.63	14.059	6 17 23.3	87.07	23 55.3
10	12 56 10.92	-9.532	-5 15 26.0	+58.99	11 37.6	11	13 6 10.92	14.078	-6 23 11.4	-88.92	23 40.5
14	12 55 33.03	9.404	5 11 31.8	58.05	11 21.2	15	13 7 7.20	14.053	6 28 58.3	88.49	23 25.7
18	12 54 55.79	9.205	5 7 42.1	56.89	11 4.9	19	13 8 3.29	13.984	6 34 43.0	88.80	23 10.9
22	12 54 19.47	8.948	5 3 58.8	54.93	10 48.6	23	13 8 59.02	13.875	6 40 24.4	84.84	22 56.1
26	12 53 44.30	8.631	5 0 23.1	52.82	10 32.3	27	13 9 54.23	13.723	6 46 1.4	83.63	22 41.3
30	12 53 10.50	-8.261	-4 56 56.6	+50.37	10 16.0	31	13 10 48.74	13.524	-6 51 33.1	-82.16	22 26.5
May 4	12 52 38.28	7.837	4 53 40.6	47.59	9 59.7	Nov. 4	13 11 42.36	13.277	6 56 58.3	80.40	22 11.6
8	12 52 7.87	7.359	4 50 36.4	44.47	9 43.5	8	13 12 34.90	12.922	7 2 15.8	78.34	21 56.8
12	12 51 39.48	6.829	4 47 45.2	41.03	9 27.3	12	13 13 26.16	12.642	7 7 24.7	76.02	21 41.9
16	12 51 13.30	6.254	4 45 8.4	37.32	9 11.1	16	13 14 15.98	12.360	7 12 23.7	73.46	21 27.0
20	12 50 49.50	-5.640	-4 42 47.0	+33.36	8 55.0	20	13 15 4.18	11.837	-7 17 12.1	-70.68	21 12.0
24	12 50 28.22	4.995	4 40 41.8	29.19	8 39.0	24	13 15 50.62	11.375	7 21 48.8	67.65	20 57.1
28	12 50 9.57	4.324	4 38 53.6	24.86	8 22.9	28	13 16 35.13	10.869	7 26 13.0	64.40	20 42.1
June 1	12 49 53.68	3.621	4 37 23.1	20.37	8 6.9	Dec. 2	13 17 17.52	10.318	7 30 23.7	60.89	20 27.0
5	12 49 40.64	2.894	4 36 10.8	15.73	7 51.0	6	13 17 57.63	9.798	7 34 19.9	57.16	20 12.0
9	12 49 30.55	-2.145	-4 35 17.4	+10.95	7 35.1	10	13 18 35.30	+9.099	-7 38 0.7	-53.21	19 56.9
13	12 49 23.50	1.380	4 34 43.3	6.09	7 19.2	14	13 19 10.38	8.438	7 41 25.3	49.10	19 41.7
17	12 49 19.53	-0.605	4 34 28.8	+1.16	7 3.5	18	13 19 42.76	7.748	7 44 33.2	44.82	19 26.5
21	12 49 18.66	+0.172	4 34 34.0	-3.77	6 47.8	22	13 20 12.33	7.029	7 47 23.7	40.30	19 11.3
25	12 49 20.90	0.950	4 34 59.0	8.70	6 32.1	26	13 20 38.96	6.281	7 49 56.3	35.82	18 56.0
29	12 49 26.26	+1.728	-4 35 43.6	-13.80	6 16.4	30	13 21 2.54	+5.503	-7 52 10.1	-31.10	18 40.6
July 3	12 49 34.73	+2.506	-4 36 47.8	-18.49	6 0.8	34	13 21 22.96	+4.709	-7 54 4.8	-26.25	18 25.9

Greatest horizontal parallax,  
Least horizontal parallax,

April 7, 0".51.  
October 9, 0".46.

Greatest semidiameter,  
Least semidiameter,

April 7, 1".92.  
October 9, 1".73.

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. of R. A. for 1 Day.	Apparent Declination.	Var. of Decl. for 1 Day.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. of R. A. for 1 Day.	Apparent Declination.	Var. of Decl. for 1 Day.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
Jan. 1	h m s	s	° ' "	"	h m	July 3	h m s	s	° ' "	"	h m
5	3 43 4.21	-4.718	+17 57 13.4	-19.64	8 59.2	7	3 58 6.86	+7.497	+18 49 48.4	+20.04	21 7.0
9	3 42 46.18	4.991	17 56 26.0	11.08	8 43.2	11	3 58 36.19	7.164	18 51 6.1	18.81	20 51.7
13	3 42 29.92	3.835	17 55 44.9	9.44	8 27.2	15	3 59 4.14	6.806	18 52 18.8	17.52	20 36.4
17	3 42 15.54	3.359	17 55 10.6	7.71	8 11.3	19	3 59 30.60	6.490	18 53 26.3	16.21	20 21.1
21	3 42 3.14	2.842	17 54 43.3	5.99	7 55.3	23	3 59 55.47	6.019	18 54 28.4	14.83	20 5.8
25	3 41 52.83	-2.314	+17 54 23.3	-4.08	7 39.4	27	4 0 18.67	+5.586	+18 55 24.9	+13.42	19 50.5
29	3 41 44.64	1.777	17 54 10.7	2.90	7 23.6	31	4 0 40.13	5.141	18 56 15.7	11.98	19 35.1
Feb. 2	3 41 38.63	1.298	17 54 5.7	-0.30	7 7.8	Aug. 4	4 0 59.77	4.676	18 57 0.7	10.51	19 19.7
6	3 41 34.83	0.671	17 54 8.3	+1.59	6 52.0	8	4 1 17.51	4.149	18 57 39.7	8.99	19 4.3
10	3 41 33.96	-0.107	17 54 18.4	3.48	6 36.2	12	4 1 33.26	3.684	18 58 12.6	7.45	18 48.8
14	3 41 33.98	+0.464	+17 54 36.2	+5.40	6 20.5	16	4 1 46.97	+3.168	+18 58 39.3	+5.90	18 33.3
18	3 41 36.98	1.034	17 55 1.6	7.31	6 4.8	20	4 1 58.59	2.641	18 58 59.8	4.32	18 17.8
22	3 41 42.25	1.602	17 55 34.6	9.17	5 49.2	24	4 2 8.09	2.106	18 59 13.9	2.75	18 2.2
26	3 41 49.79	2.163	17 56 14.9	10.97	5 33.6	28	4 2 15.43	1.565	18 59 21.8	+1.90	17 46.6
Mar. 1	3 41 59.54	2.719	17 57 2.3	12.79	5 18.0	Sept. 1	4 2 20.60	1.016	18 59 23.5	-0.36	17 30.9
5	3 42 11.47	+3.251	+17 57 56.6	+14.42	5 2.5	5	4 2 23.55	+0.461	+18 59 18.9	-1.93	17 15.2
9	3 42 25.53	3.778	17 58 57.6	16.06	4 47.0	9	4 2 24.29	-0.093	18 59 8.1	3.48	16 59.5
13	3 42 41.08	4.293	18 0 5.0	17.63	4 31.6	13	4 2 22.81	0.646	18 58 51.1	5.09	16 43.8
17	3 42 59.85	4.791	18 1 18.5	19.12	4 16.1	17	4 2 19.13	1.193	18 58 28.0	6.52	16 28.0
21	3 43 19.98	5.269	18 2 37.8	20.52	4 0.7	21	4 2 13.28	1.731	18 57 59.0	7.96	16 12.1
25	3 43 41.97	+5.722	+18 4 2.5	+21.80	3 45.4	25	4 2 5.30	-2.257	+18 57 24.4	-9.36	15 56.3
29	3 44 5.73	6.151	18 5 32.1	23.00	3 30.0	29	4 1 55.24	2.768	18 56 44.2	10.72	15 40.4
Apr. 2	3 44 31.15	6.557	18 7 6.4	24.12	3 14.7	Oct. 3	4 1 43.17	3.268	18 55 58.7	12.09	15 24.4
6	3 44 58.16	6.942	18 8 44.9	25.12	2 59.5	7	4 1 29.12	3.750	18 55 8.1	13.97	15 8.5
10	3 45 26.65	7.299	18 10 27.2	26.02	2 44.2	11	4 1 13.20	4.207	18 54 12.6	14.45	14 52.5
14	3 45 56.52	+7.631	+18 12 12.9	+26.82	2 29.0	15	4 0 55.50	-4.637	+18 53 12.6	-15.54	14 36.5
18	3 46 27.66	7.932	18 14 1.6	27.51	2 13.8	19	4 0 36.14	5.039	18 52 8.4	16.54	14 20.4
22	3 46 59.94	8.204	18 15 52.8	28.07	1 58.6	23	4 0 15.23	5.408	18 51 0.4	17.44	14 4.3
26	3 47 33.25	8.444	18 17 46.0	28.52	1 43.4	27	3 59 52.92	5.745	18 49 49.0	18.26	13 48.2
30	3 48 7.45	8.652	18 19 40.8	28.87	1 28.2	31	3 59 29.31	6.051	18 48 34.5	18.96	13 32.1
May 4	3 48 42.43	+8.834	+18 21 36.8	+29.12	1 13.1	Nov. 4	3 59 4.56	-6.390	+18 47 17.5	-19.54	13 16.0
8	3 49 18.08	8.985	18 23 33.6	29.26	0 57.9	8	3 58 38.81	6.546	18 45 58.3	20.03	12 59.8
12	3 49 54.97	9.105	18 25 30.7	29.26	0 42.8	12	3 58 12.25	6.727	18 44 37.4	20.38	12 43.6
16	3 50 30.88	9.193	18 27 27.7	29.22	0 27.7	16	3 57 45.05	6.866	18 43 15.4	20.60	12 27.5
20	3 51 7.77	9.245	18 29 24.3	29.04	0 12.6	20	3 57 17.38	6.961	18 41 52.8	20.67	12 11.3
24	3 51 44.80	+9.268	+18 31 19.9	+28.75	23 53.7	24	3 56 49.42	-7.019	+18 40 30.2	-20.62	11 55.1
28	3 52 21.87	9.259	18 33 14.2	28.38	23 38.5	28	3 56 21.34	7.090	18 39 8.0	20.45	11 38.9
June 1	3 52 58.83	9.217	18 35 6.8	27.91	23 23.4	32	3 55 53.32	6.961	18 37 46.8	20.15	11 22.7
5	3 53 35.57	9.148	18 36 57.4	27.36	23 8.3	Dec. 2	3 55 25.55	6.896	18 36 27.0	19.70	11 6.5
9	3 54 11.97	9.048	18 38 45.6	26.73	22 53.2	6	3 54 58.21	6.765	18 35 9.4	19.10	10 50.3
13	3 54 47.91	+8.916	+18 40 31.1	+26.00	22 38.0	10	3 54 31.49	-6.587	+18 33 54.4	-18.37	10 34.2
17	3 55 23.25	8.750	18 42 13.5	25.19	22 22.9	14	3 54 5.57	6.367	18 32 42.6	17.59	10 18.0
21	3 55 57.87	8.553	18 43 52.5	24.29	22 7.7	18	3 53 40.61	6.106	18 31 34.4	16.55	10 1.9
25	3 56 31.64	8.309	18 45 27.7	23.31	21 52.6	22	3 53 16.77	5.867	18 30 30.4	15.44	9 45.8
29	3 57 4.47	8.061	18 46 58.9	22.28	21 37.4	26	3 52 54.20	5.472	18 29 31.0	14.25	9 29.6
July 3	3 57 36.25	+7.803	+18 48 25.9	+21.20	21 22.2	30	3 52 33.04	-5.101	+18 28 36.5	-12.96	9 13.6
	3 58 6.86	+7.497	+18 49 48.4	+20.04	21 7.0	34	3 52 13.44	-4.693	+18 27 47.4	-11.55	8 57.5

Greatest horizontal parallax,  
Least horizontal parallax,

November 22, 0".31.  
May 21, 0".29.

Greatest semidiameter,  
Least semidiameter,

November 22, 1".33.  
May 21, 1".25.

MERCURY.									
GREENWICH MEAN NOON.									
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—		
							At Date.	At Intermediate Date.	
Jan. 1	248 35 50.8	2 45 3.0	+ 8 50.1	-2 35 19.9	-18 48.8	9.6682079	0.1461082	0.1478254	
3	254 5 23.0	2 44 37.5	10 27.6	3 12 6.2	17 56.8	9.6689909	0.1493694	0.1507429	
5	259 34 53.6	2 45 1.2	11 41.8	3 47 4.2	17 0.5	9.6687518	0.1519481	0.1529865	
7	265 6 0.4	2 46 13.7	12 30.6	4 20 4.1	15 58.8	9.6674624	0.1538591	0.1545665	
9	270 40 21.5	2 48 15.8	12 51.5	4 50 54.4	14 50.6	9.6651289	0.1551088	0.1554853	
11	276 19 38.1	2 51 9.5	+12 42.9	-5 19 21.5	-13 34 9	9.6617455	0.1556949	0.1557361	
13	282 5 35.4	2 54 57.0	12 3.9	5 45 8.7	12 10.9	9.6573049	0.1556067	0.1553040	
15	288 0 4.1	2 59 41.4	10 53.7	6 7 55.9	10 34.7	9.6517986	0.1548246	0.1541643	
17	294 5 1.7	3 5 36.8	9 12.6	6 27 18.6	8 45.5	9.6452206	0.1533182	0.1522813	
19	300 22 35.2	3 12 18.0	7 2.1	6 42 47.0	6 39.9	9.6375678	0.1510466	0.1496072	
21	306 55 1.0	3 20 20.0	+ 4 25.2	-6 53 45.2	- 4 16.0	9.6288442	0.1479551	0.1460817	
23	313 44 46.3	3 29 38.7	+ 1 27.2	6 59 30.6	- 1 26.4	9.6190667	0.1439764	0.1416285	
25	320 54 30.7	3 40 19.8	- 1 44.5	6 59 12.8	+ 1 49.0	9.6082708	0.1390255	0.1361537	
27	328 27 3.2	3 52 27.5	4 59.6	6 51 54.0	5 35.2	9.5965205	0.1329988	0.1295442	
29	336 25 20.7	4 6 5.0	8 3.0	6 36 29.4	9 55.1	9.5839209	0.1257726	0.1210653	
31	344 52 22.7	4 21 11.4	-10 37.0	-6 11 50.5	+14 49.5	9.5708337	0.1172022	0.1123621	
Feb. 2	353 51 1.3	4 37 20.9	12 20.3	5 36 50.2	20 15.5	9.5568947	0.1071223	0.1014589	
4	3 23 46.6	4 55 14.8	12 51.5	4 50 32.9	26 4.4	9.5430342	0.0953479	0.0887654	
6	13 32 23.5	5 13 25.6	11 51.4	3 52 28.9	31 58.5	9.5294917	0.0816868	0.0740896	
8	24 17 24.4	5 31 29.6	9 11.5	2 42 54.9	37 28.7	9.5168208	0.0659525	0.0572575	
10	35 37 34.7	5 48 22.6	- 5 0.3	-1 23 16.3	+41 55.7	9.5056710	0.0479904	0.0381428	
12	47 29 16.1	6 2 47.4	+ 0 13.1	+0 3 35.2	44 33.8	9.4967365	0.0277138	0.0167107	
14	59 46 10.4	6 13 21.0	5 34.1	1 33 18.4	44 41.8	9.4906687	0.0051518	9.9930668	
16	72 19 15.2	6 18 47.7	9 58.6	3 0 25.9	41 58.4	9.4879624	9.9804986	9.9675045	
18	84 57 25.2	6 18 21.4	12 29.7	4 19 14.1	36 26.0	9.4883537	9.9541574	9.9405453	
20	97 28 41.5	6 11 57.0	+12 37.5	+5 24 46.0	+28 49.1	9.4932637	9.9267710	9.9129532	
22	109 41 42.3	6 0 17.1	10 28.4	6 13 45.0	20 4.0	9.5008179	9.8992222	9.8857206	
24	121 27 9.0	5 44 36.4	6 37.6	6 44 56.8	11 11.4	9.5109302	9.8726000	9.8600165	
26	132 38 27.2	5 26 24.6	+ 1 56.7	6 58 58.6	+ 3 0.2	9.5229149	9.8481272	9.8370852	
28	143 12 5.4	5 7 9.8	- 2 45.3	6 57 44.9	- 4 0.8	9.5360912	9.8270337	9.8181010	
Mar. 1	153 7 11.3	4 48 1.7	- 6 50.6	+6 43 49.2	- 9 41.3	9.5498524	9.8103945	9.8039952	
3	162 24 48.9	4 29 48.1	9 57.3	6 19 52.5	14 9.9	9.5637007	9.7989550	9.7952953	
5	171 7 20.3	4 12 59.2	11 56.1	5 48 23.8	17 15.2	9.5772522	9.7930062	9.7920486	
7	179 17 51.8	3 57 49.3	12 48.5	5 11 30.1	19 29.9	9.5902252	9.7923578	9.7938483	
9	186 59 46.6	3 44 22.8	12 41.0	4 30 54.6	20 58.9	9.6024228	9.7964205	9.7999645	
11	194 16 30.6	3 32 37.7	-11 43.5	+3 47 58.1	-21 52.6	9.6137135	9.8043667	9.8095132	
13	201 11 20.9	3 22 27.9	10 7.0	3 3 42.2	22 19.5	9.6240139	9.8152942	9.8216053	
15	207 47 20.9	3 13 46.3	8 1.5	2 18 53.5	22 26.4	9.6332754	9.8283514	9.8354458	
17	214 7 20.1	3 6 25.8	5 36.8	1 34 6.5	22 18.5	9.6414726	9.8428117	9.8503820	
19	220 13 53.2	3 0 19.5	3 1.5	0 49 47.1	21 59.4	9.6485959	9.8580974	9.8659082	
21	226 9 21.0	2 55 20.0	- 0 22.8	+0 6 14.4	-21 22.1	9.6546440	9.8737718	9.8816523	
23	231 55 53.0	2 51 22.3	+ 2 12.7	-0 36 16.9	20 58.2	9.6596252	9.8895200	9.8973501	
25	237 35 28.5	2 48 22.2	4 40.0	1 17 35.1	20 19.2	9.6635438	9.9051226	9.9128216	
27	243 9 58.7	2 46 16.6	6 54.3	1 57 30.7	19 35.7	9.6664089	9.9204340	9.9279495	
29	248 41 9.0	2 45 2.2	8 51.8	2 35 55.0	18 48.0	9.6682270	9.9353602	9.9426608	
31	254 10 40.7	2 44 37.6	+10 29.0	-3 12 39.7	-17 56.0	9.6690028	9.9498463	9.9569140	
33	259 40 12.1	2 45 1.8	+11 42.8	-3 47 35.9	-16 59.4	9.6687385	9.9638619		

## MERCURY.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Apr. 0	254 0 40.7	2 44 37.6	+10 29.0	-3 12 39.7	-17 56.0	9.6690028	9.9498463	9.9569140
2	259 40 12.1	2 45 1.8	11 42.8	3 47 35.9	16 59.4	9.6687385	9.9638619	9.9706889
4	265 11 20.7	2 46 15.1	12 31.2	4 20 33.9	15 57.4	9.6674331	9.9773945	9.9839789
6	270 45 45.7	2 48 18.0	12 51.6	4 51 22.1	14 49.5	9.6650834	9.9904426	9.9967862
8	276 25 7.9	2 51 12.3	12 42.6	5 19 46.8	13 33.9	9.6616837	0.0030105	0.0091163
10	282 11 12.1	2 55 0.6	+12 3.0	-5 45 31.4	-19 9.0	9.6572265	0.0151046	0.0209757
12	288 5 49.3	2 59 46.2	10 52.3	6 8 15.5	10 33.2	9.6517039	0.0267301	0.0323685
14	294 10 57.7	3 5 38.7	9 10.8	6 27 34.9	8 43.7	9.6451095	0.0378904	0.0432954
16	300 28 43.9	3 12 24.8	6 59.8	6 42 59.4	6 37.8	9.6374403	0.0485821	0.0537491
18	307 1 24.5	3 20 25.1	4 22.7	6 53 53.1	4 12.4	9.6287006	0.0587943	0.0637148
20	313 51 27.4	3 29 48.0	+ 1 24.3	-6 59 33.3	- 1 23.4	9.6189072	0.0685067	0.0731655
22	321 1 31.6	3 40 30.3	- 1 47.6	6 59 9.4	+ 1 52.3	9.6080963	0.0776859	0.0820614
24	328 34 26.8	3 52 39.6	5 2.5	6 51 43.5	5 39.0	9.5963322	0.0862347	0.0903469
26	336 33 9.9	4 6 18.4	8 5.6	6 36 10.8	9 59.4	9.5837212	0.0942377	0.0979460
28	343 0 40.0	4 21 26.2	10 39.4	6 11 22.8	14 54.3	9.5704255	0.1014591	0.1047627
30	353 59 49.4	4 37 55.8	-12 21.5	-5 36 12.4	+20 20.8	9.5566825	0.1078413	0.1106777
May 2	3 33 7.4	4 55 31.1	12 51.3	4 49 44.2	26 10.0	9.5428238	0.1132531	0.1155478
4	13 42 18.2	5 13 49.6	11 49.8	3 51 29.2	28 3.8	9.5292909	0.1175404	0.1192086
6	24 27 52.4	5 31 46.5	9 8.1	2 41 45.0	37 33.2	9.5166389	0.1205297	0.1214809
8	35 48 33.4	5 48 37.2	- 4 55.2	-1 21 58.1	41 59.1	9.5055184	0.1220396	0.1231840
10	47 40 41.7	6 2 59.3	+ 0 18.1	+0 4 58.1	+44 35.1	9.4966238	0.1218942	0.1211524
12	59 57 54.9	6 13 28.2	5 38.7	1 34 41.4	44 40.4	9.4906048	0.1199443	0.1182585
14	72 31 9.0	6 18 49.8	10 2.0	3 1 43.8	41 55.2	9.4879531	0.1160889	0.1134333
16	85 9 17.7	6 18 17.8	12 31.0	4 20 21.6	36 20.0	9.4888997	0.1102947	0.1066802
18	97 40 21.3	6 11 48.2	12 36.6	5 25 39.4	28 41.3	9.4933615	0.1026020	0.0980761
20	109 53 0.1	6 0 3.6	+10 25.4	+6 14 22.0	+19 55.5	9.5009597	0.0931215	0.0877596
22	121 37 55.9	5 44 19.8	6 33.5	6 45 17.4	11 3.5	9.5111059	0.0820140	0.0759093
24	132 48 40.0	5 26 7.3	+ 1 52.2	6 59 4.1	+ 2 53.2	9.5231136	0.0694705	0.0627225
26	143 21 43.4	5 6 52.1	- 2 49.4	6 57 37.4	- 4 6.8	9.5363027	0.0566898	0.0483956
28	153 16 13.6	4 47 44.2	6 53.9	6 43 31.2	9 45.6	9.5500682	0.0408625	0.0331114
30	162 33 17.5	4 29 31.8	- 9 59.7	+6 19 26.5	-14 6.4	9.5639140	0.0251621	0.0170332
June 1	171 15 17.7	4 12 44.2	11 57.5	5 47 51.9	17 17.6	9.5774579	0.0087420	0.0003040
3	179 25 21.0	3 57 36.1	12 48.9	5 10 54.1	19 31.6	9.5904196	9.9917345	9.9830475
5	187 6 51.1	3 44 11.2	12 40.5	4 30 15.9	21 0.0	9.6026034	9.9742562	9.9653734
7	194 23 13.4	3 29 27.6	11 42.3	3 47 17.7	21 53.2	9.6138788	9.9564117	9.9473829
9	201 17 44.9	3 22 19.1	-10 5.3	+3 3 1.0	-22 19.7	9.6241631	9.9382997	9.9291745
11	207 53 28.7	3 13 38.9	7 59.3	2 18 12.1	22 26.4	9.6334079	9.9200202	9.9108506
13	214 13 14.5	3 6 19.7	5 34.4	1 33 25.4	22 18.3	9.6415884	9.9016803	9.8925249
15	220 19 36.5	3 0 14.0	2 59.1	0 49 6.4	21 59.1	9.6486949	9.8834016	9.8743293
17	226 14 55.3	2 55 15.5	- 0 20.5	+0 5 34.5	21 31.6	9.6547273	9.8653285	9.8564224
19	232 1 19.9	2 51 19.0	+ 2 15.0	-0 36 55.5	-20 57.6	9.6596910	9.8476364	9.8389979
21	237 40 49.7	2 48 20.0	4 42.2	1 18 12.6	20 18.6	9.6635933	9.8305376	9.8222891
23	243 15 16.1	2 46 15.1	6 56.3	1 58 6.9	19 35.0	9.6664423	9.8142893	9.8065781
25	248 46 24.4	2 45 1.5	8 53.4	2 36 29.7	18 47.2	9.6682445	9.7991981	9.7921954
27	254 15 55.3	2 44 37.6	10 30.3	3 13 12.8	17 55.2	9.6690046	9.7856190	9.7795192
29	259 45 27.4	2 45 2.7	+11 44.0	-3 48 7.4	-16 58.6	9.6657247	9.7739483	9.7689616
31	265 16 38.6	2 46 16.8	+12 31.8	-4 21 3.5	-15 56.6	9.6674033	9.7646105	



MERCURY.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
July 1	265 16 38.6	2 46 16.8	+12 31.8	-4 21 3.5	-15 56.8	9.6674033	9.7646105	9.7609481
3	270 51 7.7	2 48 20.6	12 51.7	4 51 49.5	14 48.3	9.6650379	9.7580237	9.7558837
5	276 30 35.4	2 51 15.8	12 42.2	5 20 11.9	13 32.6	9.6616223	9.7545694	9.7541152
7	282 16 46.8	2 55 4.8	12 2.1	5 45 53.9	12 7.7	9.6571492	9.7545487	9.7558880
9	288 11 32.9	2 59 51.0	10 50.9	6 8 35.1	10 31.6	9.6516105	9.7581416	9.7613095
11	294 16 51.8	3 5 38.4	+ 9 8.8	-6 27 51.0	- 8 41.9	9.6449999	9.7653805	9.7703339
13	300 34 50.4	3 12 31.6	6 57.5	6 43 11.6	6 35.8	9.6373145	9.7761406	9.7827628
15	307 7 45.8	3 20 36.0	4 20.1	6 54 0.9	4 10.0	9.6285586	9.7901557	9.7982688
17	313 58 5.6	3 29 57.0	+ 1 21.4	6 59 35.8	- 1 20.8	9.6187496	9.8070468	9.8164315
19	321 8 29.0	3 40 40.6	- 1 50.6	6 59 5.9	+ 1 55.5	9.6079235	9.8263626	9.8367787
21	328 41 46.1	3 52 51.2	- 5 5.3	-6 51 33.1	+ 5 42.8	9.5961457	9.8476179	9.8588190
23	336 40 53.7	4 6 31.4	8 8.2	6 35 52.4	10 3.7	9.5835228	9.8703225	9.8820694
25	345 8 51.2	4 21 40.4	10 41.0	6 10 55.3	14 59.0	9.5702183	9.8940031	9.9060685
27	354 8 30.4	4 38 11.2	12 22.5	5 35 35.0	20 26.0	9.5564708	9.9182119	9.9303820
29	3 42 20.0	4 55 47.2	12 51.1	4 48 56.1	26 15.4	9.5426133	9.9425281	9.9546011
31	13 52 3.6	5 13 59.1	-11 48.0	-3 50 30.4	+32 9.2	9.5200892	9.9665531	9.9783371
Aug. 2	24 38 10.5	5 32 1.6	9 5.0	2 40 36.2	37 38.0	9.5164553	9.9899073	0.0012190
4	35 59 21.8	5 48 51.6	- 4 50.9	-1 20 41.3	42 2.4	9.5053633	0.0122288	0.0228956
6	47 51 55.6	6 3 10.3	+ 0 23.2	+0 6 19.7	44 38.4	9.4965079	0.0331805	0.0430473
8	60 9 27.0	6 13 35.6	5 43.3	1 36 3.1	44 39.0	9.4905371	0.0524631	0.0614000
10	72 42 51.6	6 18 52.2	+10 5.2	+3 3 0.2	+41 48.8	9.4879394	0.0698348	0.0777495
12	85 20 58.7	6 18 14.3	12 32.2	4 21 27.9	36 13.8	9.4889414	0.0851322	0.0919763
14	97 51 50.3	6 11 39.7	12 35.4	5 26 31.6	28 33.6	9.4934546	0.0982821	0.1040542
16	110 4 7.4	5 59 51.2	10 22.6	6 14 58.3	19 47.4	9.5010966	0.1093029	0.1140425
18	121 48 34.6	5 44 4.2	6 29.6	6 45 37.5	10 55.6	9.5112764	0.1182905	0.1220668
20	132 58 45.9	5 25 50.1	+ 1 47.8	+6 59 9.2	+ 2 46.2	9.5233070	0.1253936	0.1282943
22	143 31 14.3	5 6 34.6	- 2 53.5	6 57 29.8	- 4 12.5	9.5365090	0.1307921	0.1329104
24	153 25 10.0	4 47 27.3	6 57.2	6 43 13.3	9 50.5	9.5502791	0.1346721	0.1360992
26	162 41 41.1	4 29 16.0	10 2.0	6 19 0.6	14 9.8	9.5641230	0.1372125	0.1380316
28	171 23 11.0	4 12 29.8	11 58.9	5 47 20.2	17 20.1	9.5776599	0.1385744	0.1388577
30	179 32 46.9	3 57 23.2	-12 49.2	+5 10 18.3	-19 33.3	9.5906110	0.1388969	0.1387055
Sept. 1	187 13 52.9	3 44 0.0	12 39.9	4 29 37.3	21 1.0	9.6027820	0.1382966	0.1376810
3	194 29 54.3	3 32 17.8	11 41.2	3 46 37.5	21 53.8	9.6140428	0.1368685	0.1359680
5	201 24 7.5	3 22 10.7	10 3.5	3 2 19.9	22 20.0	9.6243115	0.1346873	0.1333330
7	207 59 35.9	3 13 31.8	7 57.3	2 17 30.7	22 26.4	9.6335404	0.1318110	0.1301257
9	214 19 8.5	3 6 13.6	- 5 32.2	+1 32 44.2	-22 18.0	9.6417048	0.1282814	0.1262814
11	220 25 19.4	3 0 8.9	2 56.6	0 48 25.9	21 58.7	9.6487951	0.1241281	0.1218235
13	226 20 29.0	2 55 11.5	- 0 17.9	+0 4 54.8	21 31.1	9.6548115	0.1193685	0.1167634
15	232 6 46.6	2 51 15.9	+ 2 17.5	-0 37 34.3	20 57.1	9.6597592	0.1140089	0.1111043
17	237 46 11.0	2 48 17.8	4 44.4	1 18 50.2	20 17.9	9.6636457	0.1080482	0.1048392
19	243 20 33.7	2 46 13.6	+ 6 58.2	-1 58 43.1	-19 34.2	9.6664791	0.1014752	0.0979537
21	248 51 39.5	2 45 0.6	8 55.0	2 37 4.4	18 46.4	9.6682657	0.0942713	0.0904250
23	254 21 9.4	2 44 37.4	10 31.6	3 13 45.9	17 54.3	9.6690103	0.0864104	0.0822233
25	259 50 42.0	2 45 3.3	11 44.9	3 48 38.7	16 57.6	9.6687147	0.0778585	0.0733111
27	265 21 55.4	2 46 18.2	12 32.3	4 21 32.9	15 55.4	9.6673778	0.0685754	0.0636451
29	270 56 28.0	2 48 22.8	+12 51.8	-4 52 16.8	-14 47.2	9.6649966	0.0585143	0.0531759
31	276 36 0.7	2 51 18.7	+12 41.8	-5 20 36.8	-13 31.4	9.6615652	0.0476229	



## HELIOCENTRIC CO-ORDINATES, 1888.

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## MERCURY.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Oct. 1	276 36 0.7	2 51 18.7	+12 41.8	-5 20 36.8	-13 31.4	9.6615652	0.0476229	0.0418485
3	282 22 18.7	2 55 8.6	12 1.3	5 46 16.1	12 6.3	9.6570761	0.0358447	0.0296045
5	288 17 13.2	2 59 55.8	10 49.7	6 8 54.4	10 30.0	9.6515212	0.0231209	0.0163867
7	294 22 42.5	3 5 44.1	9 7.0	6 28 6.9	8 40.1	9.6448942	0.0093954	0.0021415
9	300 40 53.4	3 19 38.2	6 55.3	6 43 23.7	6 33.7	9.6371923	9.9946200	9.9868278
11	307 14 9.8	3 20 43.6	+ 4 17.5	-6 54 8.5	- 4 7.5	9.6284200	9.9787639	9.9704293
13	314 4 39.3	3 30 6.0	+ 1 18.5	6 59 38.2	- 1 18.0	9.6185946	9.9618294	9.9529735
15	321 15 21.9	3 40 50.8	- 1 53.6	6 59 2.4	+ 1 58.5	9.6077531	9.9438774	9.9345626
17	328 49 0.6	3 53 2.7	5 8.2	6 51 22.6	5 46.5	9.5959610	9.9250614	9.9154136
19	336 48 32.7	4 6 44.5	8 10.8	6 35 34.0	10 7.9	9.5833256	9.9056772	9.8959227
21	345 16 57.7	4 21 54.8	-10 43.0	-6 10 28.0	+15 3.8	9.5700116	9.8862398	9.8767388
23	354 17 6.6	4 38 26.8	12 23.5	5 34 57.7	20 31.2	9.5562587	9.8675535	9.8588408
25	3 51 28.3	4 56 3.7	12 50.5	4 48 8.3	26 20.8	9.5424018	9.8507819	9.8435767
27	14 1 45.3	5 14 15.9	11 46.3	3 49 31.8	32 14.4	9.5288859	9.8374403	9.8325910
29	24 48 25.4	5 39 17.8	9 1.8	2 39 27.6	37 49.7	9.5162695	9.8292374	9.8275615
31	36 10 7.8	5 49 6.3	- 4 46.3	-1 19 24.6	+42 5.8	9.5052057	9.8277037	9.8297438
Nov. 2	48 3 9.1	6 3 22.6	+ 0 28.1	+0 7 41.1	44 37.6	9.4963891	9.8336933	9.8394860
4	60 21 1.1	6 13 43.3	5 47.9	1 37 24.6	44 37.9	9.4904660	9.8469963	9.8560277
6	72 54 36.0	6 18 54.8	10 8.4	3 4 16.8	41 44.9	9.4879217	9.8663503	9.8777093
8	85 32 43.3	6 18 11.6	12 33.3	4 22 34.3	36 7.6	9.4889786	9.8898459	9.9025113
10	98 3 24.1	6 11 31.8	+12 34.5	+5 27 24.1	+28 26.0	9.4935430	9.9154788	9.9285489
12	110 15 21.2	5 59 38.7	10 19.6	6 15 34.7	19 39.0	9.5012287	9.9415547	9.9543605
14	121 59 20.9	5 43 49.0	6 25.4	6 45 57.5	10 47.7	9.5114422	9.9608605	9.9789754
16	133 8 59.8	5 25 33.2	+ 1 43.3	6 59 14.3	+ 2 39.2	9.5234962	9.9906490	0.0018441
18	143 40 53.8	5 6 17.3	- 2 57.5	6 57 21.9	- 4 18.4	9.5367118	0.0125385	0.0227227
20	153 34 15.3	4 47 10.3	- 7 0.6	+6 42 54.9	- 9 55.0	9.5504871	0.0323963	0.0415660
22	162 50 13.2	4 29 0.0	10 4.2	6 18 34.2	14 13.3	9.5643294	0.0502427	0.0584420
24	171 31 12.9	4 12 15.4	12 0.1	5 46 47.8	17 22.6	9.5778598	0.0661816	0.0734805
26	179 40 21.4	3 57 10.3	12 49.5	5 9 41.6	19 35.0	9.5908012	0.0803577	0.0868323
28	187 21 3.0	3 43 48.5	12 39.4	4 28 57.9	21 2.1	9.6029597	0.0929236	0.0986506
30	194 36 42.8	3 32 7.8	-11 39.8	+3 45 56.4	-21 54.4	9.6142065	0.1040308	0.1090811
Dec. 2	201 30 37.4	3 22 2.1	10 1.7	3 1 38.0	22 20.2	9.6244604	0.1138174	0.1182547
4	208 5 49.7	3 13 24.4	7 55.0	2 16 48.6	22 26.4	9.6336737	0.1224074	0.1262863
6	214 25 8.6	3 6 7.4	5 29.7	1 32 2.3	22 17.8	9.6418222	0.1299096	0.1332826
8	220 31 8.1	3 0 3.8	2 54.2	0 47 44.6	21 58.6	9.6488964	0.1364176	0.1393240
10	226 26 8.6	2 55 7.4	- 0 15.5	+0 4 14.4	-21 30.6	9.6548968	0.1420102	0.1444843
12	232 12 18.8	2 51 12.7	+ 2 19.8	-0 38 13.7	20 56.5	9.6598286	0.1467538	0.1488247
14	237 51 37.6	2 48 15.3	4 46.5	1 19 28.3	20 17.3	9.6636992	0.1507027	0.1523930
16	243 25 56.0	2 46 11.9	7 0.2	1 59 19.8	19 33.6	9.6665167	0.1539002	0.1552281
18	248 56 59.5	2 44 59.9	8 56.7	2 37 39.7	18 45.6	9.6682375	0.1563798	0.1573579
20	254 26 28.7	2 44 37.5	+10 32.9	-3 14 19.5	-17 53.5	9.6690163	0.1581650	0.1588021
22	259 56 2.1	2 45 4.1	11 45.7	3 49 10.5	16 56.7	9.6687048	0.1592706	0.1595710
24	265 27 17.7	2 46 19.7	12 32.8	4 22 2.7	15 54.6	9.6673519	0.1597029	0.1596664
26	271 1 54.0	2 48 25.1	12 51.8	4 52 44.5	14 46.1	9.6649546	0.1594597	0.1590816
28	276 41 32.2	2 51 21.9	12 41.4	5 21 2.0	13 30.1	9.6615068	0.1585295	0.1578009
30	282 27 57.4	2 55 12.6	+12 0.4	-5 46 38.7	-12 4.9	9.6570013	0.1568923	0.1557996
32	288 23 0.7	3 0 0.6	+10 48.2	-6 9 14.1	-10 28.4	9.6514296	0.1545181	

VENUS.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Jan. -3	155 58 30.8	1 37 28.6	+1 0.0	+3 20 42.4	+0 58.2	9.8566679	9.9423242	9.9495340
1	162 28 18.2	1 37 24.8	+0 20.2	3 23 17.5	+0 19.3	9.8566298	9.9565972	9.9635165
5	168 57 47.5	1 37 19.6	-0 20.7	3 23 16.4	-0 19.8	9.8570234	9.9702950	9.9769352
9	175 26 53.4	1 37 13.1	1 0.5	3 20 39.5	0 58.6	9.8572460	9.9834398	9.9898118
13	181 55 30.9	1 37 5.4	1 37.2	3 15 29.4	1 36.4	9.8574946	9.9960548	0.0021724
17	188 23 35.4	1 36 56.7	-2 8.9	+3 7 50.5	-2 12.8	9.8577663	0.0081686	0.0140474
21	194 51 3.2	1 36 47.1	2 34.0	2 57 49.3	2 47.4	9.8580572	0.0198123	0.0254669
25	201 17 51.3	1 36 36.9	2 51.3	2 45 34.1	3 19.8	9.8583639	0.0310145	0.0364577
29	207 43 57.4	1 36 26.2	3 0.0	2 31 14.9	3 49.4	9.8586823	0.0417983	0.0470380
Feb. 2	214 9 20.0	1 36 15.2	2 59.6	2 15 3.0	4 18.0	9.8590085	0.0521788	0.0572220
6	220 33 58.8	1 36 4.2	-2 50.3	+1 57 11.2	-4 39.3	9.8593382	0.0621687	0.0670209
10	226 57 54.1	1 35 53.5	2 32.5	1 37 53.5	4 59.0	9.8596675	0.0717804	0.0764489
14	233 21 7.1	1 35 43.2	2 7.2	1 17 24.5	5 14.9	9.8599921	0.0810288	0.0855230
18	239 43 40.0	1 35 33.6	1 35.7	0 55 59.8	5 26.9	9.8603081	0.0899339	0.0942636
22	246 5 35.4	1 35 24.5	0 59.5	0 33 55.5	5 34.7	9.8606117	0.0985145	0.1026885
26	252 26 56.6	1 35 16.3	-0 20.4	+0 11 28.0	-5 38.4	9.8608990	0.1067871	0.1108116
Mar. 1	258 47 47.5	1 35 9.3	+0 19.7	-0 11 6.3	5 38.0	9.8611667	0.1147622	0.1186402
5	265 8 12.5	1 35 3.4	0 58.8	0 33 30.8	5 33.5	9.8614114	0.1224459	0.1261798
9	271 28 16.0	1 34 58.6	1 34.9	0 55 29.3	5 25.0	9.8616302	0.1298428	0.1334351
13	277 48 2.7	1 34 54.9	2 6.3	1 16 46.0	5 12.7	9.8618206	0.1369585	0.1404137
17	284 7 37.1	1 34 52.4	+2 31.6	-1 37 5.6	-4 56.5	9.8619802	0.1438024	0.1471262
21	290 27 3.8	1 34 51.1	2 49.6	1 56 12.5	4 36.8	9.8621070	0.1503866	0.1535847
25	296 46 27.1	1 34 50.8	2 59.3	2 13 56.1	4 13.9	9.8621998	0.1567214	0.1597977
29	303 5 51.3	1 34 51.4	3 0.3	2 30 0.7	3 47.9	9.8622574	0.1628138	0.1657701
Apr. 2	309 25 20.2	1 34 53.0	2 52.5	2 44 15.6	3 19.2	9.8622789	0.1686663	0.1715023
6	315 44 57.0	1 34 55.5	+2 36.4	-2 56 30.8	-2 48.0	9.8622842	0.1742776	0.1769925
10	322 4 44.8	1 34 58.6	2 12.7	3 6 37.2	2 14.8	9.8622135	0.1796470	0.1822415
14	328 24 46.3	1 35 2.3	1 42.5	3 14 27.4	1 40.0	9.8621273	0.1847767	0.1872534
18	334 45 3.7	1 35 6.5	1 7.3	3 19 55.6	1 2.9	9.8620067	0.1896720	0.1920336
22	341 5 38.7	1 35 11.1	+0 28.8	3 22 57.6	-0 26.9	9.8618533	0.1943386	0.1965877
26	347 26 32.9	1 35 16.0	-0 11.1	-3 23 30.7	+0 10.4	9.8616687	0.1987810	0.2009186
30	353 47 47.6	1 35 21.3	0 50.5	3 21 34.3	0 47.8	9.8614550	0.2029999	0.2050246
May 4	0 9 23.8	1 35 26.8	1 27.5	3 17 9.3	1 24.6	9.8612148	0.2069922	0.2089019
8	6 31 22.4	1 35 32.5	2 0.3	3 10 18.5	2 0.6	9.8609512	0.2107532	0.2125460
12	12 53 43.9	1 35 38.3	2 27.1	3 1 6.4	2 35.2	9.8606672	0.2142806	0.2159567
16	19 16 29.1	1 35 44.3	-2 46.7	-2 49 39.2	+3 8.0	9.8603662	0.2175746	0.2191350
20	25 39 38.6	1 35 50.5	2 58.1	2 36 5.1	3 36.6	9.8600521	0.2206396	0.2220853
24	32 3 13.2	1 35 56.8	3 0.8	2 20 33.4	4 6.7	9.8597286	0.2234757	0.2248097
28	38 27 13.4	1 36 3.3	2 54.4	2 3 15.5	4 31.8	9.8593998	0.2260871	0.2273076
June 1	44 51 39.9	1 36 10.0	2 39.3	1 44 23.7	4 53.6	9.8590697	0.2284703	0.2295748
5	51 16 33.4	1 36 16.8	-2 16.2	-1 24 11.8	+5 11.8	9.8587424	0.2306202	0.2316059
9	57 41 54.6	1 36 23.8	1 46.3	1 2 54.7	5 26.1	9.8584223	0.2325318	0.2333978
13	64 7 44.1	1 36 30.9	1 11.0	0 40 48.4	5 36.4	9.8581132	0.2342040	0.2349504
17	70 34 2.2	1 36 38.1	-0 32.1	-0 18 9.4	5 42.4	9.8578190	0.2356378	0.2362667
21	77 0 49.2	1 36 45.3	+0 8.4	+0 4 45.2	5 44.1	9.8575437	0.2368372	0.2373499
25	83 28 4.8	1 36 52.4	+0 48.6	+0 27 37.9	+5 41.4	9.8572908	0.2378053	0.2382036
29	89 55 48.6	1 36 59.4	1 26.4	0 50 11.0	5 34.4	9.8570635	0.2385418	0.2388222
33	96 23 59.8	1 37 6.1	+1 59.8	+1 12 7.2	+5 23.0	9.8568647	0.2390436	

## VENUS.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
July 3	96 23 59.8	1 37 6.1	+1 59.8	+1 12 7.2	+5 23.0	9.8568647	0.2390436	0.2392051
7	102 52 36.6	1 37 19.3	2 27.2	1 33 9.1	5 7.4	9.8566971	0.2393066	0.2393479
11	109 21 37.1	1 37 17.9	2 47.1	1 53 0.6	4 47.8	9.8565629	0.2393288	0.2392496
15	115 50 58.8	1 37 22.8	2 58.4	2 11 26.0	4 24.4	9.8564638	0.2391109	0.2389135
19	122 20 38.2	1 37 26.8	3 0.6	2 28 10.7	3 57.5	9.8564013	0.2386577	0.2383445
23	128 50 31.6	1 37 29.7	+2 53.6	+2 43 1.7	+3 27.5	9.8563761	0.2379743	0.2375472
27	135 20 34.6	1 37 31.5	2 37.7	2 55 47.0	2 54.8	9.8563885	0.2370633	0.2365228
31	141 50 42.3	1 37 32.1	2 13.7	3 6 16.8	2 19.8	9.8564383	0.2359253	0.2352703
Aug. 4	148 20 49.5	1 37 31.3	1 42.8	3 14 23.0	1 43.0	9.8565251	0.2345578	0.2337873
8	154 50 50.7	1 37 29.1	1 6.8	3 19 59.4	1 5.0	9.8566475	0.2329589	0.2320724
12	161 20 40.3	1 37 25.5	+0 27.3	+3 23 1.7	+0 26.1	9.8568037	0.2311286	0.2301231
16	167 50 12.7	1 37 20.5	-0 13.6	3 23 27.9	-0 13.0	9.8569920	0.2290713	0.2279593
20	174 19 22.6	1 37 14.2	0 53.7	3 21 18.1	0 51.8	9.8572097	0.2267928	0.2255723
24	180 48 4.9	1 37 6.7	1 31.1	3 16 34.4	1 29.8	9.8574541	0.2242986	0.2229715
28	187 16 15.1	1 36 58.2	2 3.8	3 9 21.1	2 6.6	9.8577218	0.2215911	0.2201570
Sept. 1	193 43 49.2	1 36 48.7	-2 30.2	+2 59 44.3	-2 41.5	9.8580096	0.2186693	0.2171273
5	200 10 44.0	1 36 36.5	2 48.9	2 47 51.8	3 14.3	9.8583137	0.2155309	0.2138794
9	206 36 57.0	1 36 27.9	2 59.1	2 33 53.5	3 44.4	9.8586301	0.2121735	0.2104135
13	213 2 27.0	1 36 17.0	3 0.4	2 18 0.5	4 11.6	9.8589549	0.2085998	0.2067328
17	219 27 13.1	1 36 6.1	2 52.6	2 0 25.2	4 35.5	9.8592840	0.2048132	0.2028417
21	225 51 15.5	1 35 55.2	-2 36.2	+1 41 21.4	-4 55.8	9.8596134	0.2008192	0.1987455
25	232 14 35.5	1 35 44.9	2 12.1	1 21 3.8	5 12.4	9.8599388	0.1966205	0.1944445
29	238 37 15.0	1 35 35.0	1 41.6	0 59 47.7	5 25.0	9.8602563	0.1922168	0.1899365
Oct. 3	244 59 16.5	1 35 25.9	1 6.1	0 37 49.2	5 33.6	9.8605619	0.1876029	0.1852155
7	251 20 43.3	1 35 17.6	-0 27.3	+0 15 24.6	5 38.0	9.8608519	0.1827738	0.1802774
11	257 41 39.2	1 35 10.4	+0 12.7	-0 7 9.7	-5 38.4	9.8611228	0.1777263	0.1751205
15	264 2 8.3	1 35 4.3	0 52.1	0 29 37.1	5 34.6	9.8613714	0.1724603	0.1697459
19	270 22 15.2	1 34 59.3	1 28.9	0 51 41.3	5 26.8	9.8615945	0.1669776	0.1641557
23	276 42 4.4	1 34 55.5	2 1.3	1 13 6.4	5 15.1	9.8617897	0.1612798	0.1583495
27	283 1 40.7	1 34 52.8	2 27.7	1 33 37.1	4 59.6	9.8619545	0.1553641	0.1523224
31	289 21 8.5	1 34 51.2	+2 47.0	-1 52 58.6	-4 40.6	9.8620870	0.1492232	0.1460652
Nov. 4	295 40 32.2	1 34 50.8	2 58.2	2 10 57.0	4 18.2	9.8621856	0.1428472	0.1395680
8	301 50 56.0	1 34 51.3	3 0.8	2 27 19.6	3 59.7	9.8622492	0.1362265	0.1328220
12	308 19 23.8	1 34 52.7	2 54.5	2 41 54.5	3 24.4	9.8622768	0.1293540	0.1258220
16	314 38 59.1	1 34 55.0	2 39.8	2 54 31.3	2 53.6	9.8622684	0.1222259	0.1185654
20	320 58 44.9	1 34 58.0	+2 17.3	-3 5 0.8	-2 20.8	9.8622239	0.1148398	0.1110480
24	327 18 43.9	1 35 1.6	1 48.2	3 13 15.3	1 46.2	9.8621439	0.1071892	0.1032619
28	333 38 58.4	1 35 5.7	1 13.7	3 19 8.7	1 10.3	9.8620291	0.0992641	0.0951936
Dec. 2	339 59 30.3	1 35 10.3	+0 35.7	3 22 36.5	-0 33.5	9.8618811	0.0910483	0.0868259
6	346 20 21.2	1 35 15.2	-0 4.1	3 23 35.8	+0 3.8	9.8617016	0.0825246	0.0781419
10	352 41 32.4	1 35 20.4	-0 43.8	-3 22 5.5	+0 41.2	9.8614927	0.0736764	0.0691268
14	359 3 4.8	1 35 25.8	1 21.3	3 18 6.3	1 18.2	9.8612569	0.0644013	0.0597694
18	5 24 59.5	1 35 31.4	1 54.9	3 11 40.7	1 54.4	9.8609968	0.0549594	0.0500599
22	11 47 17.1	1 35 37.3	2 22.9	3 2 52.8	2 29.3	9.8607160	0.0450692	0.0399849
26	18 9 58.3	1 35 43.3	2 43.9	2 51 48.8	3 2.4	9.8604176	0.0348046	0.0295249
30	24 33 3.7	1 35 49.5	-2 56.8	-2 38 36.2	+3 33.5	9.8601052	0.0241424	0.0180535
34	30 56 31.0	1 35 55.7	-3 0.9	-2 23 24.3	+4 2.0	9.8597928	0.0130548	

MARS.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Jan. 1	156 44 17.1	26 12.56	-31.8	+1 45 33.8	-15.73	0.2215819	0.1414228	0.1350797
5	158 29 8.4	26 13.14	34.3	1 44 27.9	17.20	0.2214966	0.1286296	0.1220714
9	160 14 2.6	26 14.01	36.8	1 43 16.2	18.65	0.2213701	0.1154042	0.1086287
13	161 59 1.0	26 15.21	39.1	1 41 58.7	20.10	0.2212020	0.1017450	0.0947547
17	163 44 4.8	26 16.72	41.3	1 40 35.4	21.55	0.2209927	0.0876581	0.0804574
21	165 29 15.2	26 18.50	-43.4	+1 39 6.3	-22.96	0.2207421	0.0731537	0.0657474
25	167 14 33.2	26 20.59	45.3	1 37 31.6	24.39	0.2204505	0.0582395	0.0506320
29	169 0 0.3	26 22.97	47.0	1 35 51.2	25.78	0.2201178	0.0429247	0.0351192
Feb. 2	170 45 37.4	26 25.64	48.4	1 34 5.3	27.16	0.2197442	0.0272175	0.0192217
6	172 31 25.8	26 28.61	49.8	1 32 13.8	28.55	0.2193300	0.0111363	0.0029665
10	174 17 26.7	26 31.91	-50.9	+1 30 16.9	-29.91	0.2188753	9.9947178	9.9863975
14	176 3 41.5	26 35.51	52.0	1 28 14.5	31.27	0.2183804	9.9780135	9.9695750
18	177 50 11.2	26 39.35	52.9	1 26 6.7	32.60	0.2178457	9.9610918	9.9525732
22	179 36 56.7	26 43.51	53.4	1 23 53.7	33.92	0.2172710	9.9440297	9.9354734
26	181 23 59.7	26 48.02	53.7	1 21 35.4	35.21	0.2166572	9.9269160	9.9183715
Mar. 1	183 11 21.3	26 52.81	-53.9	+1 19 12.0	-36.50	0.2160041	9.9098558	9.9013865
5	184 59 2.6	26 57.91	53.9	1 16 43.4	37.77	0.2153125	9.8929839	9.8846697
9	186 47 5.0	27 3.34	53.6	1 14 9.8	39.00	0.2145823	9.8764701	9.8684111
13	188 35 29.7	27 9.02	53.1	1 11 31.4	40.23	0.2138142	9.8605233	9.8528355
17	190 24 17.6	27 15.02	52.4	1 8 48.0	41.45	0.2130086	9.8453785	9.8381848
21	192 13 30.3	27 21.36	-51.5	+1 5 59.8	-42.63	0.2121660	9.8312850	9.8247112
25	194 3 8.9	27 27.96	50.4	1 3 7.0	43.79	0.2112869	9.8184945	9.8126659
29	195 53 14.4	27 34.86	49.1	1 0 9.5	44.92	0.2103715	9.8072566	9.8022977
Apr. 2	197 43 48.2	27 42.07	47.6	0 57 7.6	46.02	0.2094210	9.7978183	9.7938471
6	199 34 51.4	27 49.56	45.9	0 54 1.3	47.11	0.2084357	9.7904096	9.7875269
10	201 26 25.1	27 57.35	-43.9	+0 50 50.7	-48.16	0.2074162	9.7852174	9.7834926
14	203 18 30.8	28 5.45	41.8	0 47 36.0	49.17	0.2063632	9.7823591	9.7818157
18	205 11 9.4	28 13.90	39.4	0 44 17.3	50.16	0.2052774	9.7818560	9.7824700
22	207 4 22.2	28 22.69	37.0	0 40 54.7	51.13	0.2041599	9.7836408	9.7853482
26	208 58 10.5	28 31.61	34.2	0 37 28.3	52.04	0.2030111	9.7875702	9.7902815
30	210 52 35.5	28 40.90	-31.4	+0 33 58.4	-52.91	0.2018324	9.7934570	9.7970669
May 4	212 47 38.1	28 50.44	28.4	0 30 25.0	53.78	0.2006242	9.8010823	9.8054725
8	214 43 19.4	29 0.30	25.2	0 26 48.3	54.55	0.1993875	9.8102060	9.8152500
12	216 39 40.9	29 10.46	21.9	0 23 8.6	55.29	0.1981238	9.8205720	9.8261385
16	218 36 43.5	29 20.86	18.5	0 19 26.0	56.00	0.1968338	9.8319179	9.8378308
20	220 34 28.2	29 31.56	-15.0	+0 15 40.6	-56.65	0.1955192	9.8439978	9.8502427
24	222 32 56.3	29 42.50	11.5	0 11 52.8	57.25	0.1941807	9.8565918	9.8630248
28	224 32 8.5	29 53.67	7.8	0 8 2.6	57.79	0.1928197	9.8695234	9.8760696
June 1	226 32 6.0	30 5.09	4.1	0 4 10.5	58.26	0.1914373	9.8826508	9.8892516
5	228 32 49.5	30 16.79	-0.3	+0 0 16.5	58.69	0.1900352	9.8958587	9.9024598
9	230 34 20.6	30 28.75	+3.5	-0 3 39.0	-59.03	0.1886148	9.9090440	9.9155997
13	232 36 39.8	30 40.89	7.4	0 7 35.7	59.31	0.1871778	9.9221171	9.9285878
17	234 39 48.0	30 53.94	11.2	0 11 33.5	59.54	0.1857257	9.9350041	9.9413600
21	236 43 46.0	31 5.77	14.9	0 15 32.0	59.67	0.1842601	9.9476503	9.9538723
25	238 48 34.5	31 18.54	18.7	0 19 30.9	59.79	0.1827827	9.9600231	9.9661009
29	240 54 14.6	31 31.51	+22.3	-0 23 29.8	-59.70	0.1812955	9.9721048	9.9780338
July 3	243 0 46.8	31 44.59	+25.8	-0 27 28.5	-59.60	0.1798003	9.9838864	9.9896614

## MARS.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
July 3	243 0 46.8	31 44.59	+25.8	-0 27 28.5	-59.60	0.1798003	9.9838864	9.9896614
7	245 8 11.5	31 57.84	29.3	0 31 26.6	59.40	0.1782987	9.9953573	0.0009729
11	247 16 29.7	32 11.22	32.6	0 35 23.7	59.11	0.1767934	0.0065061	0.0119561
15	249 25 41.5	32 24.72	35.7	0 39 19.5	58.74	0.1752860	0.0173226	0.0226051
19	251 35 47.7	32 38.34	38.7	0 43 13.6	58.25	0.1737790	0.0278039	0.0329209
23	253 46 48.3	32 52.01	+41.4	-0 47 5.5	-57.67	0.1722746	0.0379581	0.0429156
27	255 58 43.9	33 5.76	43.9	0 50 54.9	56.99	0.1707748	0.0477970	0.0526035
31	258 11 34.4	33 19.52	46.3	0 54 41.4	56.30	0.1692822	0.0573361	0.0619967
Aug. 4	260 25 20.1	33 33.29	48.2	0 58 24.5	55.59	0.1677991	0.0665858	0.0711036
8	262 40 0.7	33 47.04	50.0	1 2 3.7	54.96	0.1663280	0.0755513	0.0799286
12	264 55 36.4	34 0.74	+51.4	-1 5 38.6	-53.19	0.1648716	0.0842359	0.0884745
16	267 12 6.6	34 14.39	52.6	1 9 8.7	51.89	0.1634323	0.0926462	0.0967523
20	269 29 31.4	34 27.94	53.4	1 12 33.7	50.54	0.1620130	0.1007947	0.1047759
24	271 47 50.0	34 41.37	53.8	1 15 53.0	49.05	0.1606160	0.1086980	0.1125625
28	274 7 2.3	34 54.65	53.9	1 19 6.1	47.44	0.1592442	0.1163717	0.1201281
Sept. 1	276 27 7.1	35 7.71	+53.7	-1 22 12.5	-45.72	0.1579001	0.1238317	0.1274831
5	278 48 3.8	35 20.60	53.1	1 25 11.9	43.90	0.1565863	0.1310832	0.1346328
9	281 9 51.7	35 33.27	52.1	1 28 3.7	41.94	0.1553061	0.1381323	0.1415824
13	283 32 29.7	35 45.61	50.7	1 30 47.4	39.86	0.1540617	0.1449844	0.1483398
17	285 55 56.3	35 57.59	49.0	1 33 22.6	37.67	0.1528562	0.1516500	0.1549174
21	288 20 10.1	36 9.26	+47.0	-1 35 48.8	-35.36	0.1516920	0.1581434	0.1613304
25	290 45 10.0	36 20.60	44.6	1 38 5.5	32.95	0.1505717	0.1644794	0.1675919
29	293 10 54.4	36 31.51	41.9	1 40 12.4	30.45	0.1494981	0.1706700	0.1737136
Oct. 3	295 37 21.5	36 41.96	38.9	1 42 9.1	27.84	0.1484736	0.1767227	0.1796985
7	298 4 29.4	36 51.90	35.5	1 43 55.1	25.12	0.1475006	0.1826409	0.1855510
11	300 32 16.0	37 1.34	+31.9	-1 45 30.1	-22.32	0.1465816	0.1884286	0.1912750
15	303 0 39.4	37 10.24	28.0	1 46 53.7	19.44	0.1457188	0.1940917	0.1968797
19	305 29 37.1	37 18.56	24.0	1 48 5.6	16.49	0.1449145	0.1996417	0.2023781
23	307 59 7.0	37 26.27	19.7	1 49 5.6	13.46	0.1441707	0.2050903	0.2077798
27	310 29 6.4	37 33.32	15.2	1 49 53.3	10.37	0.1434892	0.2104478	0.2130942
31	312 59 32.7	37 39.79	+10.7	-1 50 26.6	-7.24	0.1428719	0.2157196	0.2183240
Nov. 4	315 30 23.8	37 45.59	5.9	1 50 51.2	4.05	0.1423206	0.2209078	0.2234707
8	318 1 36.5	37 50.65	+ 1.3	1 51 1.0	- 0.85	0.1418367	0.2260131	0.2285357
12	320 33 8.0	37 54.99	- 3.5	1 50 58.0	+ 2.37	0.1414215	0.2310388	0.2335234
16	323 4 55.4	37 58.57	8.2	1 50 42.0	5.62	0.1410758	0.2359913	0.2384430
20	325 36 55.6	38 1.42	-12.9	-1 50 13.0	+ 8.87	0.1408011	0.2408801	0.2433027
24	328 9 5.8	38 3.54	17.4	1 49 31.0	12.11	0.1405979	0.2457119	0.2481080
28	330 41 22.9	38 4.90	21.9	1 48 36.1	15.33	0.1404667	0.2504916	0.2522614
Dec. 2	333 13 43.9	38 5.47	26.1	1 47 28.4	18.51	0.1404080	0.2552180	0.2575611
6	335 46 5.6	38 5.94	30.3	1 46 8.0	21.65	0.1404217	0.2598903	0.2622059
10	338 18 24.7	38 4.29	-34.0	-1 44 35.2	+24.74	0.1405081	0.2645075	0.2667965
14	340 50 38.8	38 2.56	37.7	1 42 50.1	27.76	0.1406669	0.2690729	0.2713380
18	343 22 44.2	38 0.04	40.9	1 40 53.1	30.72	0.1408976	0.2735918	0.2758357
22	345 54 38.1	37 56.80	43.8	1 38 44.3	33.60	0.1411997	0.2780694	0.2802935
26	348 26 17.6	37 52.80	46.5	1 36 24.3	36.38	0.1415720	0.2825078	0.2847117
30	350 57 39.5	37 48.03	-48.6	-1 33 53.3	+39.06	0.1420136	0.2869051	0.2890873
34	353 28 40.9	37 42.56	-50.5	-1 31 11.7	+41.65	0.1425234		

JUPITER.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Jan. 1	230 29 52.2	4 37.64	-26.9	+0 59 4.6	-4.18	0.7322535	0.7836238	0.7819908
5	230 48 23.0	4 37.73	27.0	0 58 47.8	4.21	0.7321802	0.7803043	0.7785646
9	231 6 54.1	4 37.83	27.0	0 58 30.9	4.24	0.7321065	0.7767726	0.7749288
13	231 25 25.6	4 37.92	27.0	0 58 13.9	4.26	0.7320322	0.7730342	0.7710893
17	231 43 57.5	4 38.01	27.0	0 57 56.8	4.29	0.7319574	0.7690956	0.7670542
21	232 2 29.8	4 38.11	-27.0	+0 57 39.6	-4.31	0.7318820	0.7649663	0.7628330
25	232 21 2.4	4 38.20	27.1	0 57 22.3	4.34	0.7318062	0.7606554	0.7584347
29	232 39 35.5	4 38.30	27.1	0 57 4.9	4.37	0.7317299	0.7561721	0.7538687
Feb. 2	232 58 8.9	4 38.40	27.1	0 56 47.4	4.40	0.7316530	0.7515257	0.7491444
6	233 16 42.7	4 38.50	27.1	0 56 29.7	4.42	0.7315756	0.7467262	0.7442724
10	233 35 16.9	4 38.60	-27.1	+0 56 12.0	-4.45	0.7314978	0.7417852	0.7392663
14	233 53 51.5	4 38.70	27.1	0 55 54.1	4.47	0.7314194	0.7367179	0.7341422
18	234 12 26.5	4 38.80	27.1	0 55 36.2	4.50	0.7313406	0.7315415	0.7289182
22	234 31 1.9	4 38.90	27.1	0 55 18.1	4.53	0.7312613	0.7262745	0.7236123
26	234 49 37.7	4 39.01	27.1	0 55 0.0	4.55	0.7311814	0.7209342	0.7182426
Mar. 1	235 8 13.9	4 39.11	-27.1	+0 54 41.7	-4.58	0.7311011	0.7155401	0.7128290
5	235 26 50.6	4 39.21	27.1	0 54 23.4	4.60	0.7310203	0.7101123	0.7073925
9	235 45 27.6	4 39.31	27.1	0 54 4.9	4.63	0.7309389	0.7046731	0.7019575
13	236 4 5.0	4 39.41	27.1	0 53 46.3	4.65	0.7308571	0.6992492	0.6965515
17	236 22 42.9	4 39.52	27.1	0 53 27.7	4.67	0.7307748	0.6938689	0.6912044
21	236 41 21.2	4 39.62	-27.0	+0 53 8.9	-4.70	0.7306919	0.6885619	0.6859450
25	236 59 59.9	4 39.73	27.0	0 52 50.0	4.73	0.7306086	0.6833574	0.6808028
29	237 18 39.0	4 39.84	27.0	0 52 31.0	4.76	0.7305249	0.6782849	0.6758074
Apr. 2	237 37 18.6	4 39.95	26.9	0 52 12.0	4.78	0.7304406	0.6733744	0.6709839
6	237 55 58.6	4 40.05	26.9	0 51 52.8	4.81	0.7303559	0.6686583	0.6663840
10	238 14 39.0	4 40.16	-26.9	+0 51 33.5	-4.83	0.7302707	0.6641713	0.6620248
14	238 33 19.9	4 40.27	26.8	0 51 14.1	4.85	0.7301850	0.6599485	0.6579469
18	238 52 1.2	4 40.38	26.8	0 50 54.7	4.88	0.7300989	0.6560237	0.6541827
22	239 10 42.9	4 40.49	26.7	0 50 35.1	4.91	0.7300123	0.6524273	0.6507612
26	239 29 25.1	4 40.60	26.7	0 50 15.4	4.93	0.7299253	0.6491876	0.6477099
30	239 48 7.7	4 40.71	-26.6	+0 49 55.7	-4.95	0.7298378	0.6463311	0.6450541
May 4	240 6 50.8	4 40.83	26.6	0 49 35.8	4.98	0.7297498	0.6438821	0.6428184
8	240 25 34.4	4 40.94	26.5	0 49 15.8	5.00	0.7296614	0.6418652	0.6410252
12	240 44 18.4	4 41.06	26.4	0 48 55.8	5.02	0.7295726	0.6402999	0.6396916
16	241 3 2.8	4 41.17	26.4	0 48 35.6	5.05	0.7294833	0.6392010	0.6388294
20	241 21 47.7	4 41.29	-26.3	+0 48 15.4	-5.07	0.7293935	0.6385766	0.6384432
24	241 40 33.1	4 41.40	26.2	0 47 55.1	5.11	0.7293033	0.6384288	0.6385334
28	241 59 19.0	4 41.52	26.2	0 47 34.6	5.12	0.7292127	0.6387562	0.6390864
June 1	242 18 5.3	4 41.63	26.1	0 47 14.1	5.14	0.7291216	0.6395532	0.6401261
5	242 36 52.0	4 41.75	26.0	0 46 53.5	5.17	0.7290301	0.6408131	0.6416130
9	242 55 39.3	4 41.87	-25.9	+0 46 32.8	-5.19	0.7289381	0.6425231	0.6435411
13	243 14 27.0	4 41.99	25.8	0 46 12.0	5.21	0.7288457	0.6446641	0.6458891
17	243 33 15.2	4 42.11	25.7	0 45 51.1	5.24	0.7287529	0.6472134	0.6486327
21	243 52 3.9	4 42.23	25.6	0 45 30.1	5.26	0.7286596	0.6501436	0.6517426
25	244 10 53.1	4 42.36	25.5	0 45 9.0	5.28	0.7285659	0.6534261	0.6551903
29	244 29 42.8	4 42.48	-25.4	+0 44 47.8	-5.30	0.7284718	0.6570321	0.6589475
July 3	244 48 32.9	4 42.60	-25.3	+0 44 26.6	-5.33	0.7283772	0.6609328	0.6629845

## JUPITER.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
July 3	244 48 32.9	4 42.60	-25.3	+0 44 26.6	-5.33	0.7283772	0.6609328	0.6629845
7	245 7 23.5	4 42.72	25.2	0 44 5.2	5.35	0.7282822	0.6650984	0.6672705
11	245 26 14.7	4 42.84	25.1	0 43 43.8	5.37	0.7281868	0.6694964	0.6717718
15	245 45 6.3	4 42.97	25.0	0 43 22.3	5.39	0.7280909	0.6740927	0.6764548
19	246 3 58.4	4 43.09	24.9	0 43 0.6	5.41	0.7279946	0.6788544	0.6812874
23	246 22 51.0	4 43.22	-24.8	+0 42 38.9	-5.44	0.7278979	0.6837504	0.6862396
27	246 41 44.1	4 43.35	24.6	0 42 17.2	5.46	0.7278008	0.6887518	0.6912839
31	247 0 37.8	4 43.47	24.5	0 41 55.3	5.48	0.7277033	0.6938326	0.6963946
Aug. 4	247 19 31.9	4 43.60	24.4	0 41 33.3	5.50	0.7276054	0.6989668	0.7015458
8	247 38 26.6	4 43.72	24.2	0 41 11.3	5.52	0.7275071	0.7041285	0.7067115
12	247 57 21.7	4 43.85	-24.1	+0 40 49.2	-5.54	0.7274083	0.7092921	0.7118671
16	248 16 17.4	4 43.98	24.0	0 40 27.0	5.56	0.7273092	0.7144340	0.7169901
20	248 35 13.5	4 44.11	23.8	0 40 4.7	5.58	0.7272096	0.7195332	0.7220611
24	248 54 10.2	4 44.24	23.7	0 39 42.3	5.61	0.7271097	0.7245718	0.7270632
28	249 13 7.5	4 44.37	23.5	0 39 19.8	5.63	0.7270093	0.7295336	0.7319811
Sept. 1	249 32 5.2	4 44.50	-23.4	+0 38 57.3	-5.65	0.7269086	0.7344037	0.7367994
5	249 51 3.5	4 44.63	23.2	0 38 34.6	5.67	0.7268075	0.7391662	0.7415023
9	250 10 2.3	4 44.77	23.1	0 38 11.9	5.69	0.7267060	0.7438060	0.7460755
13	250 29 1.6	4 44.90	22.9	0 37 49.1	5.71	0.7266041	0.7483094	0.7505062
17	250 48 1.5	4 45.03	22.7	0 37 26.3	5.73	0.7265019	0.7526648	0.7547841
21	251 7 1.9	4 45.16	-22.6	+0 37 3.3	-5.75	0.7263992	0.7568631	0.7589009
25	251 26 2.8	4 45.30	22.4	0 36 40.3	5.77	0.7262962	0.7608965	0.7628490
29	251 45 4.3	4 45.43	22.3	0 36 17.2	5.79	0.7261928	0.7647572	0.7666200
Oct. 3	252 4 6.3	4 45.57	22.1	0 35 54.0	5.81	0.7260890	0.7684365	0.7702055
7	252 23 8.8	4 45.71	21.9	0 35 30.8	5.82	0.7259848	0.7719260	0.7735970
11	252 42 11.9	4 45.84	-21.7	+0 35 7.4	-5.84	0.7258802	0.7752180	0.7767881
15	253 1 15.6	4 45.98	21.5	0 34 44.0	5.86	0.7257753	0.7783071	0.7797743
19	253 20 19.8	4 46.12	21.4	0 34 20.6	5.88	0.7256701	0.7811892	0.7825514
23	253 39 24.6	4 46.26	21.2	0 33 57.0	5.90	0.7255645	0.7838605	0.7851162
27	253 58 29.9	4 46.40	21.0	0 33 33.4	5.92	0.7254585	0.7863178	0.7874647
31	254 17 35.7	4 46.53	-20.8	+0 33 9.7	-5.94	0.7253521	0.7885562	0.7895917
Nov. 4	254 36 42.1	4 46.67	20.6	0 32 45.9	5.95	0.7252454	0.7905708	0.7914929
8	254 55 49.1	4 46.81	20.4	0 32 22.0	5.97	0.7251384	0.7923577	0.7931647
12	255 14 56.7	4 46.96	20.2	0 31 58.1	5.99	0.7250310	0.7939140	0.7946053
16	255 34 4.8	4 47.10	20.0	0 31 34.1	6.01	0.7249232	0.7952386	0.7958140
20	255 53 13.5	4 47.24	-19.8	+0 31 10.0	-6.03	0.7248152	0.7963311	0.7967897
24	256 12 22.7	4 47.39	19.6	0 30 45.9	6.04	0.7247067	0.7971894	0.7975301
28	256 31 32.6	4 47.53	19.4	0 30 21.7	6.06	0.7245981	0.7978114	0.7980330
Dec. 2	256 50 43.0	4 47.67	19.2	0 29 57.4	6.08	0.7244891	0.7981947	0.7982960
6	257 9 53.9	4 47.82	19.0	0 29 33.1	6.09	0.7243797	0.7983370	0.7983175
10	257 29 5.5	4 47.96	-18.7	+0 29 8.6	-6.11	0.7242701	0.7982378	0.7980980
14	257 48 17.6	4 48.10	18.5	0 28 44.2	6.13	0.7241601	0.7978982	0.7976385
18	258 7 30.3	4 48.25	18.3	0 28 19.6	6.14	0.7240498	0.7973189	0.7969397
22	258 26 43.6	4 48.39	18.1	0 27 55.0	6.16	0.7239394	0.7965006	0.7960017
26	258 45 57.5	4 48.54	17.9	0 27 30.3	6.18	0.7238285	0.7954429	0.7948240
30	259 5 12.0	4 48.69	-17.6	+0 27 5.6	-6.19	0.7237174	0.7941450	0.7934059
34	259 24 27.0	4 48.84	-17.4	+0 26 40.8	-6.21	0.7236060	0.7928070	



SATURN.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radia Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Jan. 1	122 16 16.7	2 12.55	+0 32.1	+0 24 50.7	+5.68	0.9585058	0.9129297	0.9122413
5	122 25 6.9	2 12.53	0 32.5	0 25 13.4	5.68	0.9585350	0.9116139	0.9110491
9	122 33 57.0	2 12.51	0 33.0	0 25 36.1	5.68	0.9585644	0.9105480	0.9101120
13	122 42 47.0	2 12.49	0 33.5	0 25 58.8	5.67	0.9585940	0.9097419	0.9094389
17	122 51 36.9	2 12.47	0 34.0	0 26 21.5	5.67	0.9586236	0.9092032	0.9090355
21	123 0 26.8	2 12.45	+0 34.4	+0 26 44.2	+5.67	0.9586534	0.9089357	0.9089043
25	123 9 16.6	2 12.44	0 34.9	0 27 6.8	5.66	0.9586834	0.9089409	0.9090452
29	123 18 6.3	2 12.42	0 35.4	0 27 29.5	5.66	0.9587134	0.9092170	0.9094562
Feb. 2	123 26 55.9	2 12.40	0 35.9	0 27 52.1	5.66	0.9587436	0.9097620	0.9101341
6	123 35 45.5	2 12.38	0 36.4	0 28 14.7	5.65	0.9587739	0.9105717	0.9110741
10	123 44 35.0	2 12.36	+0 36.8	+0 28 37.3	+5.65	0.9588044	0.9116402	0.9122690
14	123 53 24.4	2 12.34	0 37.3	0 28 59.9	5.64	0.9588349	0.9129589	0.9137087
18	124 2 13.7	2 12.32	0 37.8	0 29 22.5	5.64	0.9588656	0.9145166	0.9153807
22	124 11 3.0	2 12.30	0 38.2	0 29 45.0	5.64	0.9588964	0.9162993	0.9172704
26	124 19 52.2	2 12.28	0 38.7	0 30 7.6	5.63	0.9589273	0.9182923	0.9193632
Mar. 1	124 28 41.3	2 12.26	+0 39.1	+0 30 30.1	+5.63	0.9589584	0.9204809	0.9216435
5	124 37 30.3	2 12.24	0 39.5	0 30 52.6	5.62	0.9589896	0.9228491	0.9240958
9	124 46 19.2	2 12.22	0 40.0	0 31 15.1	5.62	0.9590209	0.9253813	0.9267035
13	124 55 8.1	2 12.21	0 40.5	0 31 37.6	5.62	0.9590523	0.9280602	0.9294491
17	125 3 56.9	2 12.19	0 40.9	0 32 0.0	5.61	0.9590839	0.9308676	0.9323133
21	125 12 45.6	2 12.17	+0 41.4	+0 32 22.5	+5.61	0.9591155	0.9337840	0.9352773
25	125 21 34.2	2 12.15	0 41.8	0 32 44.9	5.61	0.9591473	0.9367912	0.9383234
29	125 30 22.8	2 12.13	0 42.3	0 33 7.3	5.60	0.9591793	0.9398719	0.9414347
Apr. 2	125 39 11.2	2 12.11	0 42.7	0 33 29.7	5.60	0.9592113	0.9430098	0.9445954
6	125 47 59.6	2 12.09	0 43.2	0 33 52.1	5.59	0.9592435	0.9461893	0.9477895
10	125 56 47.9	2 12.07	+0 43.6	+0 34 14.5	+5.59	0.9592758	0.9493941	0.9510010
14	126 5 36.2	2 12.05	0 44.1	0 34 36.8	5.59	0.9593082	0.9526083	0.9542137
18	126 14 24.3	2 12.03	0 44.5	0 34 59.1	5.58	0.9593407	0.9558157	0.9574124
22	126 23 12.4	2 12.01	0 45.0	0 35 21.5	5.58	0.9593734	0.9590022	0.9605835
26	126 32 0.4	2 11.99	0 45.4	0 35 43.8	5.57	0.9594062	0.9621550	0.9637152
30	126 40 48.3	2 11.97	+0 45.9	+0 36 6.0	+5.57	0.9594391	0.9652627	0.9667962
May 4	126 49 36.2	2 11.95	0 46.3	0 36 28.3	5.56	0.9594721	0.9683144	0.9698157
8	126 58 23.9	2 11.93	0 46.7	0 36 50.6	5.56	0.9595053	0.9712989	0.9727626
12	127 7 11.6	2 11.90	0 47.1	0 37 12.8	5.55	0.9595385	0.9742057	0.9756268
16	127 15 59.1	2 11.88	0 47.6	0 37 35.0	5.55	0.9595719	0.9770248	0.9783965
20	127 24 46.6	2 11.86	+0 48.0	+0 37 57.2	+5.54	0.9596054	0.9797471	0.9810695
24	127 33 34.0	2 11.84	0 48.4	0 38 19.3	5.54	0.9596390	0.9823650	0.9836329
28	127 42 21.4	2 11.82	0 48.9	0 38 41.5	5.54	0.9596728	0.9848725	0.9860829
June 1	127 51 8.6	2 11.80	0 49.3	0 39 3.6	5.53	0.9597066	0.9872633	0.9884131
5	127 59 55.8	2 11.78	0 49.7	0 39 25.7	5.53	0.9597406	0.9895315	0.9906175
9	128 8 42.8	2 11.76	+0 50.1	+0 39 47.8	+5.52	0.9597747	0.9916705	0.9926898
13	128 17 29.8	2 11.74	0 50.6	0 40 9.9	5.52	0.9598089	0.9936747	0.9946246
17	128 26 16.7	2 11.72	0 51.0	0 40 32.0	5.51	0.9598432	0.9955391	0.9964179
21	128 35 3.6	2 11.69	0 51.4	0 40 54.0	5.51	0.9598777	0.9972605	0.9980666
25	128 43 50.3	2 11.67	0 51.9	0 41 16.0	5.50	0.9599122	0.9988358	0.9995680
29	128 52 36.9	2 11.65	+0 52.3	+0 41 38.0	+5.50	0.9599469	1.0002626	1.0009192
July 3	129 1 23.5	2 11.63	+0 52.7	+0 42 0.0	+5.49	0.9599817	1.0015375	1.0021170

## SATURN.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
July 3	129 1 23.5	2 11.63	+0 52.7	+0 42 0.0	+5.49	0.9599817	1.0015375	1.0021170
7	129 10 10.0	2 11.61	0 53.2	0 42 22.0	5.49	0.9600166	1.0026574	1.0031583
11	129 18 56.4	2 11.59	0 53.6	0 42 43.9	5.48	0.9600516	1.0036193	1.0040401
15	129 27 42.7	2 11.57	0 54.0	0 43 5.8	5.48	0.9600867	1.0044208	1.0047612
19	129 36 29.0	2 11.54	0 54.4	0 43 27.7	5.47	0.9601220	1.0050613	1.0053211
23	129 45 15.1	2 11.52	+0 54.8	+0 43 49.6	+5.47	0.9601574	1.0055404	1.0057191
27	129 54 1.1	2 11.50	0 55.2	0 44 11.5	5.46	0.9601928	1.0058571	1.0059545
31	130 2 47.1	2 11.48	0 55.6	0 44 33.3	5.46	0.9602284	1.0060109	1.0060263
Aug. 4	130 11 33.0	2 11.46	0 56.0	0 44 55.1	5.45	0.9602641	1.0060005	1.0059332
8	130 20 18.7	2 11.43	0 56.4	0 45 16.9	5.44	0.9602999	1.0058246	1.0056745
12	130 29 4.4	2 11.41	+0 56.8	+0 45 38.7	+5.44	0.9603358	1.0054833	1.0052510
16	130 37 50.0	2 11.39	0 57.2	0 46 0.4	5.43	0.9603719	1.0049778	1.0046641
20	130 46 35.6	2 11.37	0 57.6	0 46 22.2	5.43	0.9604080	1.0043099	1.0039153
24	130 55 21.0	2 11.34	0 58.0	0 46 43.9	5.42	0.9604443	1.0034805	1.0030057
28	131 4 6.3	2 11.32	0 58.4	0 47 5.6	5.42	0.9604807	1.0024910	1.0019364
Sept. 1	131 12 51.6	2 11.30	+0 58.8	+0 47 27.2	+5.41	0.9605171	1.0013421	1.0007083
5	131 21 36.7	2 11.28	0 59.2	0 47 48.9	5.41	0.9605537	1.0000354	0.9993235
9	131 30 21.8	2 11.26	0 59.6	0 48 10.5	5.40	0.9605904	0.9985731	0.9977847
13	131 39 6.8	2 11.23	1 0.0	0 48 32.1	5.40	0.9606273	0.9969588	0.9960960
17	131 47 57.7	2 11.21	1 0.4	0 48 53.7	5.39	0.9606642	0.9951967	0.9942615
21	131 56 36.5	2 11.19	+1 0.8	+0 49 15.2	+5.39	0.9607012	0.9932910	0.9922856
25	132 5 21.2	2 11.17	1 1.2	0 49 36.8	5.38	0.9607384	0.9912459	0.9901720
29	132 14 5.8	2 11.15	1 1.6	0 49 58.3	5.38	0.9607756	0.9890650	0.9879253
Oct. 3	132 22 50.4	2 11.12	1 2.0	0 50 19.8	5.37	0.9608130	0.9867537	0.9855507
7	132 31 34.8	2 11.10	1 2.4	0 50 41.2	5.36	0.9608505	0.9843174	0.9830547
11	132 40 19.2	2 11.08	+1 2.7	+0 51 2.7	+5.36	0.9608880	0.9817638	0.9804458
15	132 49 3.4	2 11.05	1 3.1	0 51 24.1	5.35	0.9609257	0.9791018	0.9777326
19	132 57 47.6	2 11.03	1 3.5	0 51 45.5	5.34	0.9609635	0.9763395	0.9749235
23	133 6 31.6	2 11.01	1 3.8	0 52 6.8	5.34	0.9610014	0.9734856	0.9720268
27	133 15 15.6	2 10.98	1 4.2	0 52 28.2	5.33	0.9610394	0.9705484	0.9690518
31	133 23 59.5	2 10.96	+1 4.6	+0 52 49.5	+5.33	0.9610776	0.9675385	0.9660097
Nov. 4	133 32 43.3	2 10.93	1 4.9	0 53 10.8	5.32	0.9611157	0.9644672	0.9629124
8	133 41 27.0	2 10.91	1 5.3	0 53 32.0	5.31	0.9611541	0.9613473	0.9597737
12	133 50 10.6	2 10.89	1 5.7	0 53 53.3	5.31	0.9611925	0.9581934	0.9566082
16	133 58 54.1	2 10.86	1 6.1	0 54 14.5	5.30	0.9612311	0.9550197	0.9534296
20	134 7 37.5	2 10.84	+1 6.4	+0 54 35.7	+5.30	0.9612697	0.9518399	0.9502523
24	134 16 20.8	2 10.82	1 6.8	0 54 56.9	5.29	0.9613085	0.9486689	0.9470914
28	134 25 4.0	2 10.79	1 7.2	0 55 18.0	5.28	0.9613473	0.9455221	0.9439633
Dec. 2	134 33 47.2	2 10.77	1 7.5	0 55 39.1	5.28	0.9613863	0.9424173	0.9408862
6	134 42 30.2	2 10.75	1 7.9	0 56 0.2	5.27	0.9614254	0.9393724	0.9378784
10	134 51 13.1	2 10.72	+1 8.3	+0 56 21.3	+5.27	0.9614645	0.9364064	0.9349586
14	134 59 56.0	2 10.70	1 8.6	0 56 42.4	5.26	0.9615038	0.9335374	0.9321451
18	135 8 38.8	2 10.68	1 9.0	0 57 3.4	5.25	0.9615432	0.9307836	0.9294549
22	135 17 21.4	2 10.65	1 9.3	0 57 24.4	5.25	0.9615827	0.9281614	0.9269052
26	135 26 4.0	2 10.63	1 9.7	0 57 45.3	5.24	0.9616223	0.9256887	0.9245141
30	135 34 46.4	2 10.60	+1 10.0	+0 58 6.3	+5.23	0.9616620	0.9233836	0.9222995
34	135 43 28.8	2 10.58	+1 10.4	+0 58 27.2	+5.22	0.9617018	0.9212638	

URANUS.								
GREENWICH MEAN NOON.								
Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Intermediate Date.
Jan. 1	194 0 33.7	46.28	-8.2	+0 39 57.3	-0.32	1.2640080	1.2660128	1.2643964
9	194 6 44.0	46.28	8.2	0 39 54.8	0.32	1.2640224	1.2627688	1.2611376
17	194 12 54.2	46.28	8.2	0 39 52.2	0.32	1.2640369	1.2595113	1.2578891
25	194 19 4.4	46.27	8.2	0 39 49.7	0.32	1.2640514	1.2563088	1.2547485
Feb. 2	194 25 14.6	46.27	8.3	0 39 47.1	0.32	1.2640661	1.2532260	1.2517493
10	194 31 24.7	46.27	-8.3	+0 39 44.6	-0.32	1.2640807	1.2503267	1.2489667
18	194 37 34.9	46.26	8.3	0 39 42.0	0.32	1.2640954	1.2476774	1.2464663
26	194 43 44.9	46.26	8.3	0 39 39.4	0.32	1.2641101	1.2453396	1.2443034
Mar. 5	194 49 55.0	46.26	8.3	0 39 36.8	0.32	1.2641244	1.2433636	1.2425259
13	194 56 5.0	46.25	8.3	0 39 34.2	0.32	1.2641397	1.2417958	1.2411777
21	195 2 15.0	46.25	-8.4	+0 39 31.6	-0.33	1.2641546	1.2406752	1.2402904
29	195 8 25.0	46.24	8.4	0 39 29.0	0.33	1.2641695	1.2400252	1.2398804
Apr. 6	195 14 34.9	46.24	8.4	0 39 26.4	0.33	1.2641845	1.2398569	1.2399553
14	195 20 44.9	46.24	8.4	0 39 23.8	0.33	1.2641995	1.2401749	1.2405133
22	195 26 54.7	46.23	8.4	0 39 21.1	0.33	1.2642145	1.2409680	1.2415355
30	195 33 4.6	46.23	-8.4	+0 39 18.5	-0.33	1.2642296	1.2422115	1.2429927
May 8	195 39 14.4	46.23	8.4	0 39 15.9	0.33	1.2642448	1.2438743	1.2448514
16	195 45 24.2	46.22	8.5	0 39 13.2	0.33	1.2642600	1.2459175	1.2470658
24	195 51 34.0	46.22	8.5	0 39 10.5	0.33	1.2642752	1.2482904	1.2495834
June 1	195 57 43.7	46.21	8.5	0 39 7.9	0.33	1.2642905	1.2509387	1.2523493
9	196 3 53.4	46.21	-8.5	+0 39 5.2	-0.34	1.2643059	1.2538084	1.2553079
17	196 10 3.1	46.21	8.5	0 39 2.5	0.34	1.2643213	1.2568399	1.2583968
25	196 16 12.7	46.20	8.5	0 38 59.8	0.34	1.2643367	1.2599713	1.2615566
July 3	196 22 22.4	46.20	8.5	0 38 57.1	0.34	1.2643522	1.2631462	1.2647328
11	196 28 31.9	46.20	8.6	0 38 54.4	0.34	1.2643677	1.2663092	1.2678684
19	196 34 41.5	46.19	-8.6	+0 38 51.7	-0.34	1.2643833	1.2694037	1.2709089
27	196 40 51.0	46.19	8.6	0 38 49.0	0.34	1.2643990	1.2723788	1.2738078
Aug. 4	196 47 0.5	46.18	8.6	0 38 46.2	0.34	1.2644146	1.2751904	1.2765207
12	196 53 10.0	46.18	8.6	0 38 43.5	0.34	1.2644304	1.2777937	1.2790044
20	196 59 19.4	46.18	8.6	0 38 40.8	0.34	1.2644461	1.2801484	1.2812220
28	197 5 28.8	46.17	-8.6	+0 38 38.0	-0.34	1.2644620	1.2822221	1.2831446
Sept. 5	197 11 38.2	46.17	8.7	0 38 35.3	0.35	1.2644778	1.2839860	1.2847424
13	197 17 47.5	46.16	8.7	0 38 32.5	0.35	1.2644938	1.2854112	1.2859904
21	197 23 56.8	46.16	8.7	0 38 29.7	0.35	1.2645097	1.2864780	1.2868724
29	197 30 6.1	46.16	8.7	0 38 26.9	0.35	1.2645257	1.2871721	1.2873755
Oct. 7	197 36 15.3	46.15	-8.7	+0 38 24.2	-0.35	1.2645418	1.2874807	1.2874873
15	197 42 24.5	46.15	8.7	0 38 21.4	0.35	1.2645579	1.2873954	1.2872053
23	197 48 33.7	46.14	8.7	0 38 18.6	0.35	1.2645740	1.2869176	1.2865329
31	197 54 42.8	46.14	8.7	0 38 15.7	0.35	1.2645903	1.2860514	1.2854743
Nov. 8	198 0 51.9	46.13	8.8	0 38 12.9	0.35	1.2646065	1.2848035	1.2840413
16	198 7 1.0	46.13	-8.8	+0 38 10.1	-0.35	1.2646228	1.2831905	1.2822544
24	198 13 10.0	46.13	8.8	0 38 7.3	0.35	1.2646392	1.2812359	1.2801381
Dec. 2	198 19 19.0	46.12	8.8	0 38 4.4	0.35	1.2646556	1.2789649	1.2777204
10	198 25 27.9	46.12	8.8	0 38 1.6	0.36	1.2646721	1.2764100	1.2750395
18	198 31 36.9	46.11	8.8	0 37 58.8	0.36	1.2646886	1.2736145	1.2721405
26	198 37 45.8	46.11	-8.8	+0 37 55.9	-0.36	1.2647051	1.2706236	1.2690697
34	198 43 54.6	46.11	-8.8	+0 37 53.0	-0.36	1.2647217	1.2674862	

## NEPTUNE.

## GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit.	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth—	
							At Date.	At Inter- mediate Date.
Jan. 1	58° 55' 1.1"	22.00	-29.8	-1° 41' 23.2"	+0.22	1.4744966	1.4637789	1.4645121
9	58 57 57.0	22.00	29.8	1 41 21.5	0.22	1.4744972	1.4652941	1.4661213
17	59 0 53.0	22.00	29.9	1 41 19.8	0.22	1.4744979	1.4669883	1.4678902
25	59 3 49.0	22.00	30.0	1 41 18.1	0.22	1.4744985	1.4688221	1.4697790
Feb. 2	59 6 44.9	22.00	30.0	1 41 16.3	0.22	1.4744992	1.4707561	1.4717489
10	59 9 40.9	22.00	-30.1	-1 41 14.6	+0.22	1.4744999	1.4727520	1.4737604
18	59 12 36.8	22.00	30.2	1 41 12.8	0.22	1.4745006	1.4747688	1.4757718
26	59 15 32.8	22.00	30.3	1 41 11.1	0.22	1.4745013	1.4767652	1.4777445
Mar. 5	59 18 28.8	21.99	30.3	1 41 9.3	0.22	1.4745020	1.4787055	1.4796437
13	59 21 24.7	21.99	30.4	1 41 7.6	0.22	1.4745028	1.4805551	1.4814352
21	59 24 20.7	21.99	-30.4	-1 41 5.8	+0.22	1.4745035	1.4822807	1.4830877
29	59 27 16.6	21.99	30.5	1 41 4.1	0.22	1.4745042	1.4838535	1.4845751
Apr. 6	59 30 12.6	21.99	30.6	1 41 2.3	0.22	1.4745050	1.4852499	1.4858750
14	59 33 8.5	21.99	30.6	1 41 0.5	0.22	1.4745057	1.4864483	1.4869670
22	59 36 4.5	21.99	30.7	1 40 58.7	0.22	1.4745065	1.4874299	1.4878354
30	59 39 0.4	21.99	-30.8	-1 40 57.0	+0.22	1.4745073	1.4881823	1.4884697
May 8	59 41 56.4	21.99	30.9	1 40 55.2	0.22	1.4745081	1.4886964	1.4888611
16	59 44 52.3	21.99	30.9	1 40 53.4	0.22	1.4745089	1.4889639	1.4890043
24	59 47 48.3	21.99	31.0	1 40 51.6	0.22	1.4745097	1.4889829	1.4888998
June 1	59 50 44.2	21.99	31.1	1 40 49.8	0.23	1.4745105	1.4887555	1.4885501
9	59 53 40.2	21.99	-31.1	-1 40 48.0	+0.23	1.4745113	1.4882848	1.4879600
17	59 56 36.1	21.99	31.2	1 40 46.2	0.23	1.4745121	1.4875776	1.4871390
25	59 59 32.1	21.99	31.2	1 40 44.4	0.23	1.4745130	1.4866461	1.4861008
July 3	60 2 28.0	21.99	31.3	1 40 42.5	0.23	1.4745138	1.4855050	1.4848602
11	60 5 24.0	21.99	31.4	1 40 40.7	0.23	1.4745147	1.4841695	1.4834352
19	60 8 19.9	21.99	-31.5	-1 40 38.9	+0.23	1.4745155	1.4826606	1.4818490
27	60 11 15.9	21.99	31.5	1 40 37.1	0.23	1.4745164	1.4810033	1.4801264
Aug. 4	60 14 11.8	21.99	31.6	1 40 35.2	0.23	1.4745173	1.4792221	1.4782936
12	60 17 7.7	21.99	31.6	1 40 33.4	0.23	1.4745182	1.4773455	1.4763819
20	60 20 3.7	21.99	31.7	1 40 31.5	0.23	1.4745192	1.4754069	1.4744247
28	60 22 59.6	21.99	-31.8	-1 40 29.7	+0.23	1.4745201	1.4734395	1.4724551
Sept. 5	60 25 55.5	21.99	31.8	1 40 27.8	0.23	1.4745210	1.4714769	1.4705099
13	60 28 51.5	21.99	31.9	1 40 26.0	0.23	1.4745220	1.4695585	1.4686275
21	60 31 47.4	21.99	32.0	1 40 24.1	0.23	1.4745229	1.4677212	1.4668442
29	60 34 43.4	21.99	32.0	1 40 22.3	0.23	1.4745239	1.4660010	1.4651962
Oct. 7	60 37 39.3	21.99	-32.1	-1 40 20.4	+0.23	1.4745249	1.4644344	1.4637202
15	60 40 35.2	21.99	32.2	1 40 18.5	0.23	1.4745258	1.4630571	1.4624494
23	60 43 31.1	21.99	32.2	1 40 16.6	0.23	1.4745268	1.4618999	1.4614121
31	60 46 27.1	21.99	32.3	1 40 14.8	0.24	1.4745278	1.4609888	1.4606331
Nov. 8	60 49 23.0	21.99	32.3	1 40 12.9	0.24	1.4745289	1.4603470	1.4601333
16	60 52 19.0	21.99	-32.4	-1 40 11.0	+0.24	1.4745299	1.4599025	1.4599255
24	60 55 14.9	21.99	32.5	1 40 9.1	0.24	1.4745309	1.4599325	1.4600142
Dec. 2	60 58 10.8	21.99	32.5	1 40 7.2	0.24	1.4745320	1.4601706	1.4604012
10	61 1 6.8	21.99	32.6	1 40 5.3	0.24	1.4745330	1.4607041	1.4610779
18	61 4 2.7	21.99	32.7	1 40 3.4	0.24	1.4745341	1.4615199	1.4620278
26	61 6 58.6	21.99	-32.7	-1 40 1.5	+0.24	1.4745352	1.4625986	1.4632300
34	61 9 54.6	21.99	-32.8	-1 39 59.5	+0.24	1.4745363	1.4639177	

FOR GREENWICH MEAN NOON AND MIDNIGHT.									
Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Jan. 0	+0.1632047	+0.1718201	+011	-0.8894711	-0.8881031	+218	-0.3858652	-0.3852715	-244
1	0.1804225	0.1890111	600	0.8866663	0.8851609	226	0.3846478	0.3839945	230
2	0.1975855	0.2061448	580	0.8835867	0.8819440	234	0.3833111	0.3825983	234
3	0.2146885	0.2232157	579	0.8802327	0.8784530	241	0.3818555	0.3810834	229
4	0.2317258	0.2402183	568	0.8766051	0.8746889	248	0.3802814	0.3794501	224
5	+0.2486923	+0.2571474	+558	-0.8727048	-0.8706526	+254	-0.3785891	-0.3776988	-219
6	0.2655829	0.2739981	547	0.8685326	0.8663449	260	0.3767790	0.3758299	214
7	0.2823925	0.2907053	537	0.8640896	0.8617670	266	0.3748515	0.3738440	209
8	0.2991159	0.3074435	527	0.8593771	0.8569201	272	0.3728072	0.3717415	204
9	0.3157475	0.3240270	517	0.8543961	0.8518053	277	0.3706465	0.3695228	199
10	+0.3322815	+0.3405102	+507	-0.8491478	-0.8464238	+282	-0.3683700	-0.3671896	-194
11	0.3487125	0.3568877	496	0.8436335	0.8407773	286	0.3659783	0.3647396	189
12	0.3650352	0.3731543	486	0.8378551	0.8342677	291	0.3634721	0.3621765	184
13	0.3812444	0.3893047	476	0.8318147	0.8286970	295	0.3608524	0.3595003	179
14	0.3973346	0.4053334	465	0.8255144	0.8222674	299	0.3581200	0.3567118	174
15	+0.4133004	+0.4212351	+455	-0.8189562	-0.8155810	+303	-0.3552758	-0.3538120	-169
16	0.4291367	0.4370046	444	0.8121422	0.8086402	307	0.3523206	0.3508017	164
17	0.4448382	0.4526367	434	0.8050751	0.8014476	309	0.3492555	0.3476821	159
18	0.4603997	0.4681263	423	0.7977577	0.7940058	312	0.3460817	0.3444543	154
19	0.4758161	0.4834685	413	0.7901928	0.7863174	314	0.3428003	0.3411194	149
20	+0.4910829	+0.4986589	+403	-0.7823815	-0.7783850	+316	-0.3394123	-0.3376787	-144
21	0.5061959	0.5136934	393	0.7743282	0.7702116	318	0.3359191	0.3341333	140
22	0.5211507	0.5285674	383	0.7660356	0.7618005	320	0.3323217	0.3304844	135
23	0.5359428	0.5432765	373	0.7575067	0.7531546	321	0.3286216	0.3267335	131
24	0.5505678	0.5578164	363	0.7487444	0.7442766	322	0.3248201	0.3228818	126
25	+0.5650216	+0.5721831	+353	-0.7397515	-0.7351694	+323	-0.3209186	-0.3189306	-122
26	0.5793002	0.5863726	343	0.7308007	0.7258357	324	0.3169181	0.3148811	117
27	0.5933996	0.6003808	333	0.7210849	0.7162785	324	0.3128198	0.3107344	113
28	0.6073157	0.6142038	324	0.7114169	0.7065006	324	0.3086250	0.3064919	109
29	0.6210446	0.6278377	314	0.7015297	0.6965050	324	0.3043352	0.3021551	104
30	+0.6345825	+0.6412786	+304	-0.6914266	-0.6862949	+324	-0.2999517	-0.2977253	-99
31	0.6479256	0.6545228	295	0.6811104	0.6758732	323	0.2954750	0.2932037	95
Feb. 1	0.6610700	0.6675664	286	0.6705837	0.6652424	322	0.2909090	0.2885917	91
2	0.6740118	0.6804054	277	0.6598495	0.6544056	321	0.2862522	0.2838904	87
3	0.6867470	0.6930358	268	0.6489109	0.6433660	320	0.2815067	0.2791011	83
4	+0.6992715	+0.7054535	+259	-0.6377711	-0.6321268	+318	-0.2766729	-0.2742253	-79
5	0.7115814	0.7176546	250	0.6264334	0.6206915	317	0.2717554	0.2692646	75
6	0.7236727	0.7296351	241	0.6149013	0.6090635	315	0.2667528	0.2642206	71
7	0.7355414	0.7413912	232	0.6031783	0.5972464	313	0.2616677	0.2590947	67
8	0.7471839	0.7529190	224	0.5912681	0.5852439	311	0.2565014	0.2538884	63
9	+0.7585962	+0.7642148	+216	-0.5791742	-0.5730595	+309	-0.2512555	-0.2486033	-59
10	0.7697745	0.7752747	208	0.5669003	0.5606972	306	0.2459316	0.2432410	55
11	0.7807151	0.7860951	200	0.5544507	0.5481612	304	0.2405316	0.2378035	51
12	0.7914144	0.7966726	192	0.5418295	0.5354558	301	0.2350571	0.2322924	47
13	0.8018693	0.8070041	184	0.5290408	0.5225851	298	0.2295008	0.2267096	43
14	+0.8120766	+0.8170864	+177	-0.5160891	-0.5095536	+295	-0.2238918	-0.2210569	-40
15	+0.8220331	+0.8269162	+169	-0.5029790	-0.4963659	+292	-0.2182049	-0.2153363	-36

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Feb. 15	+0.8220331	+0.8269162	+169	-0.5029790	-0.4963659	+292	-0.2182049	-0.2153363	-36
16	0.8317355	0.8364906	162	0.4897150	0.4830265	289	0.2124511	0.2095498	32
17	0.8411811	0.8458068	155	0.4763015	0.4695400	286	0.2066323	0.2036992	28
18	0.8503674	0.8548626	148	0.4627429	0.4559106	283	0.2007504	0.1977866	25
19	0.8592922	0.8636559	141	0.4490437	0.4421427	280	0.1948075	0.1918137	22
20	+0.8679535	+0.8721845	+135	-0.4352082	-0.4282409	+276	-0.1888052	-0.1857825	-19
21	0.8763490	0.8804462	128	0.4212412	0.4142098	273	0.1827456	0.1796951	16
22	0.8844764	0.8884389	122	0.4071472	0.4000539	269	0.1766308	0.1735534	12
23	0.8923337	0.8961607	115	0.3929304	0.3857773	265	0.1704627	0.1673593	9
24	0.8999194	0.9036099	109	0.3785951	0.3713843	261	0.1642432	0.1611147	6
25	+0.9072318	+0.9107849	+103	-0.3641455	-0.3568792	+257	-0.1579740	-0.1548214	-3
26	0.9142690	0.9176838	97	0.3495860	0.3422663	253	0.1516571	0.1484814	+1
27	0.9210292	0.9243048	91	0.3349208	0.3275498	249	0.1452944	0.1420965	4
28	0.9275105	0.9306461	85	0.3201540	0.3127338	244	0.1388878	0.1356686	7
29	0.9337114	0.9367063	79	0.3052898	0.2978225	240	0.1324391	0.1291995	10
Mar. 1	+0.9396305	+0.9424836	+74	-0.2903325	-0.2828203	+235	-0.1259501	-0.1226911	+14
2	0.9452657	0.9479763	69	0.2752864	0.2677315	231	0.1194227	0.1161452	17
3	0.9506153	0.9531826	64	0.2601559	0.2525603	226	0.1128588	0.1095637	20
4	0.9556779	0.9581011	59	0.2449453	0.2373113	221	0.1062602	0.1029486	23
5	0.9604519	0.9627302	54	0.2296592	0.2219892	216	0.0996920	0.0963019	25
6	+0.9649357	+0.9670683	+49	-0.2143021	-0.2065084	+211	-0.0929673	-0.0896257	+28
7	0.9691277	0.9711139	45	0.1988787	0.1911436	207	0.0862770	0.0829219	31
8	0.9730265	0.9748656	40	0.1833937	0.1756296	202	0.0795601	0.0761123	34
9	0.9766308	0.9783222	36	0.1678519	0.1600612	197	0.0728184	0.0694390	36
10	0.9799393	0.9814825	32	0.1522581	0.1444434	192	0.0660541	0.0626642	39
11	+0.9829511	+0.9843457	+28	-0.1366175	-0.1287814	+187	-0.0592695	-0.0558703	+41
12	0.9856655	0.9869110	24	0.1209354	0.1130805	182	0.0524669	0.0490595	44
13	0.9880818	0.9891779	21	0.1052169	0.0973455	177	0.0456483	0.0422338	46
14	0.9901993	0.9911459	17	0.0894667	0.0815813	172	0.0388159	0.0353953	49
15	0.9920176	0.9928147	14	0.0736898	0.0657930	167	0.0319718	0.0285461	51
16	+0.9935368	+0.9941843	+11	-0.0578915	-0.0499859	+162	-0.0251182	-0.0216886	+53
17	0.9947569	0.9952548	8	0.0420769	0.0341651	156	0.0182574	0.0148250	55
18	0.9956779	0.9960263	5	0.0262511	0.0183355	151	0.0113915	0.0079574	58
19	0.9962999	0.9964990	+2	-0.0104189	-0.0025020	146	-0.0045227	-0.0010880	60
20	0.9966234	0.9966735	-1	+0.0054148	+0.0133306	141	+0.0023468	+0.0057811	62
21	+0.9966492	+0.9965507	-4	+0.0212452	+0.0291578	+135	+0.0092149	+0.0126479	+64
22	0.9963779	0.9961311	6	0.0370678	0.0449750	130	0.0160798	0.0195105	67
23	0.9958102	0.9954154	8	0.0528784	0.0607778	124	0.0229396	0.0263669	69
24	0.9949466	0.9944042	10	0.0686724	0.0765617	119	0.0297921	0.0332150	71
25	0.9937879	0.9930984	12	0.0844450	0.0923220	113	0.0366353	0.0400527	73
26	+0.9923351	+0.9914987	-14	+0.1001918	+0.1080543	+108	+0.0434671	+0.0468781	+75
27	0.9905888	0.9896059	16	0.1159085	0.1237543	102	0.0502857	0.0536895	77
28	0.9885497	0.9874207	17	0.1315908	0.1394179	96	0.0570894	0.0604851	79
29	0.9862187	0.9849440	19	0.1472347	0.1550410	90	0.0628765	0.0672629	81
30	0.9835966	0.9821766	20	0.1628360	0.1706193	84	0.0706447	0.0740210	83
31	+0.9806841	+0.9791192	-21	+0.1783903	+0.1861484	+78	+0.0773921	+0.0807575	+85
32	+0.9774821	+0.9757728	-22	+0.1938930	+0.2016236	+72	+0.0841171	+0.0874706	+87

FOR GREENWICH MEAN NOON AND MIDNIGHT.										
Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0	
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.		Noon.
Apr. 1	+0.9774821	+0.9757728	- 22	+0.1938930	+0.2016236	+ 72	+0.0841171	+0.0874706	+ 87	
2	0.9739915	0.9721383	23	0.2093396	0.2170405	66	0.0908179	0.0941584	89	
3	0.9702132	0.9682164	23	0.2247260	0.2323951	61	0.0974924	0.1008191	91	
4	0.9661480	0.9640081	23	0.2400477	0.2476828	55	0.1041386	0.1074506	92	
5	0.9617969	0.9595146	23	0.2553001	0.2628988	49	0.1107547	0.1140509	94	
6	+0.9571613	+0.9547373	- 24	+0.2704783	+0.2780383	+ 43	+0.1173387	+0.1206181	+ 96	
7	0.9522426	0.9496776	24	0.2855779	0.2930967	37	0.1238886	0.1271501	98	
8	0.9470423	0.9443371	23	0.3005940	0.3080693	31	0.1304023	0.1336450	99	
9	0.9415621	0.9387176	23	0.3155219	0.3229515	25	0.1368779	0.1401008	101	
10	0.9358038	0.9329208	23	0.3303573	0.3377389	19	0.1433134	0.1465156	103	
11	+0.9297689	+0.9266485	- 22	+0.3450956	+0.3524268	+ 13	+0.1497070	+0.1528874	+105	
12	0.9234595	0.9202027	21	0.3597320	0.3670106	7	0.1560566	0.1592142	106	
13	0.9168783	0.9134866	20	0.3742620	0.3814858	+ 1	0.1623602	0.1654940	108	
14	0.9100278	0.9065023	19	0.3886813	0.3958480	- 5	0.1686157	0.1717249	110	
15	0.9029105	0.8992524	18	0.4029853	0.4100927	11	0.1748214	0.1779050	112	
16	+0.8955287	+0.8917395	- 16	+0.4171698	+0.4242159	- 17	+0.1809754	+0.1840325	+113	
17	0.8878852	0.8839663	14	0.4312307	0.4382137	23	0.1870759	0.1901057	115	
18	0.8799630	0.8759358	12	0.4451644	0.4520824	29	0.1931213	0.1961229	117	
19	0.8718250	0.8676508	10	0.4589673	0.4658184	35	0.1991100	0.2020825	119	
20	0.8634138	0.8591141	7	0.4726355	0.4794178	40	0.2050402	0.2079828	120	
21	+0.8547522	+0.8503286	- 4	+0.4861650	+0.4928766	- 46	+0.2109102	+0.2136221	+122	
22	0.8458435	0.8412974	- 1	0.4995522	0.5061915	51	0.2167184	0.2195989	124	
23	0.8366906	0.8320235	+ 2	0.5127940	0.5193594	57	0.2224634	0.2253119	126	
24	0.8272964	0.8225097	5	0.5258872	0.5323769	62	0.2281439	0.2309595	128	
25	0.8176637	0.8127589	8	0.5388283	0.5452407	68	0.2337583	0.2365403	130	
26	+0.8077954	+0.8027739	+ 12	+0.5516139	+0.5579473	- 73	+0.2393051	+0.2420527	+131	
27	0.7976943	0.7925574	16	0.5642405	0.5704933	79	0.2447826	0.2474951	133	
28	0.7873632	0.7821122	20	0.5767050	0.5828756	84	0.2501895	0.2528662	134	
29	0.7768048	0.7714412	24	0.5890043	0.5950910	90	0.2555246	0.2581649	136	
30	0.7660219	0.7605472	28	0.6011350	0.6071361	95	0.2607866	0.2633897	138	
May 1	+0.7550175	+0.7494333	+ 32	+0.6130937	+0.6190075	-100	+0.2659740	+0.2685392	+140	
2	0.7437949	0.7381027	37	0.6248770	0.6307016	105	0.2710852	0.2736117	141	
3	0.7323571	0.7265584	42	0.6364810	0.6422147	110	0.2761185	0.2786056	143	
4	0.7207071	0.7148035	47	0.6479024	0.6535436	115	0.2810726	0.2835196	144	
5	0.7088481	0.7028413	52	0.6591381	0.6646852	120	0.2859462	0.2883524	146	
6	+0.6967835	+0.6906753	+ 58	+0.6701847	+0.6756359	-124	+0.2907379	+0.2931025	+147	
7	0.6845169	0.6783091	63	0.6810386	0.6863923	129	0.2954461	0.2977685	149	
8	0.6720520	0.6657464	69	0.6916964	0.6969510	133	0.3000694	0.3023488	151	
9	0.6593925	0.6529910	75	0.7021552	0.7073090	137	0.3046064	0.3068421	153	
10	0.6465424	0.6400471	81	0.7124117	0.7174631	141	0.3090558	0.3112472	155	
11	+0.6335057	+0.6269187	+ 87	+0.7224626	+0.7274101	-145	+0.3134163	+0.3155627	+157	
12	0.6202866	0.6136100	94	0.7323051	0.7371473	149	0.3176865	0.3197874	159	
13	0.6068893	0.6001252	101	0.7419364	0.7466719	153	0.3218652	0.3239199	161	
14	0.5933181	0.5864687	108	0.7513537	0.7559813	156	0.3259511	0.3279591	163	
15	0.5795775	0.5726449	115	0.7605545	0.7650729	159	0.3299432	0.3319038	165	
16	+0.5656717	+0.5586581	+122	+0.7695363	+0.7739444	-162	+0.3338403	+0.3357530	+167	
17	+0.5516048	+0.5445124	+129	+0.7782969	+0.7825936	-165	+0.3376415	+0.3395059	+169	

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
May 17	+0.5516048	+0.5445124	+129	+0.7782969	+0.7825936	-165	+0.3376415	+0.3395059	+169
18	0.5373813	0.5302123	137	0.7868342	0.7910185	107	0.3413458	0.3431614	171
19	0.5220059	0.5157626	144	0.7951464	0.7992175	170	0.3449523	0.3467187	173
20	0.5084831	0.5011677	152	0.8032317	0.8071886	172	0.3484602	0.3501770	175
21	0.4938171	0.4864316	160	0.8110880	0.8149297	174	0.3518687	0.3535354	176
22	+0.4790119	+0.4715584	+168	+0.8187133	+0.8224389	-175	+0.3551770	+0.3567932	+178
23	0.4640717	0.4565523	176	0.8261060	0.8297147	177	0.3583842	0.3599496	180
24	0.4490008	0.4414176	185	0.8332645	0.8367555	178	0.3614896	0.3630039	182
25	0.4338034	0.4261584	193	0.8401872	0.8435597	179	0.3644925	0.3659554	184
26	0.4184835	0.4107787	202	0.8468725	0.8501256	179	0.3673923	0.3688033	186
27	+0.4030449	+0.3952324	+211	+0.8533157	+0.8564516	-180	+0.3701882	+0.3715470	+188
28	0.3874918	0.3796737	220	0.8595240	0.8625358	180	0.3728796	0.3741858	190
29	0.3718284	0.3639567	228	0.8654868	0.8683767	180	0.3754657	0.3767189	192
30	0.3560589	0.3481356	237	0.8712055	0.8739727	180	0.3779457	0.3791457	194
31	0.3401872	0.3322144	246	0.8766783	0.8793220	180	0.3803191	0.3814655	196
June 1	+0.3242176	+0.3161975	+255	+0.8819034	+0.8844226	-179	+0.3825852	+0.3836777	+199
2	0.3081546	0.3000895	264	0.8868791	0.8892729	178	0.3847432	0.3857814	201
3	0.2920028	0.2838950	273	0.8916036	0.8938714	177	0.3867924	0.3877760	203
4	0.2757668	0.2676186	282	0.8960757	0.8982166	176	0.3887322	0.3896608	205
5	0.2594512	0.2512851	292	0.9002938	0.9023071	174	0.3905620	0.3914353	208
6	+0.2430609	+0.2348392	+301	+0.9042564	+0.9061415	-172	+0.3922810	+0.3930987	+210
7	0.2266006	0.2183458	310	0.9079622	0.9097184	170	0.3938886	0.3946505	212
8	0.2100753	0.2017899	319	0.9114098	0.9130365	167	0.3953845	0.3960904	214
9	0.1934899	0.1851764	329	0.9145982	0.9160950	164	0.3967682	0.3974179	217
10	0.1768496	0.1685105	338	0.9175267	0.9188933	161	0.3980393	0.3986325	219
11	+0.1601595	+0.1517974	+347	+0.9201947	+0.9214307	-157	+0.3991973	+0.3997339	+221
12	0.1434246	0.1350420	356	0.9226015	0.9237067	153	0.4002420	0.4007218	223
13	0.1266499	0.1182493	365	0.9247464	0.9257206	149	0.4011732	0.4015961	226
14	0.1098405	0.1014244	374	0.9266291	0.9274721	145	0.4019907	0.4023567	228
15	0.0930014	0.0845724	383	0.9282494	0.9289612	140	0.4026943	0.4030034	231
16	+0.0761377	+0.0676982	+392	+0.9296074	+0.9301880	-135	+0.4032840	+0.4035361	+233
17	0.0592542	0.0508065	401	0.9307031	0.9311526	130	0.4037597	0.4039548	236
18	0.0423555	0.0339018	410	0.9315365	0.9318550	124	0.4041215	0.4042597	238
19	0.0254461	0.0169889	418	0.9321079	0.9322955	118	0.4043695	0.4044509	241
20	+0.0085309	+0.0000726	427	0.9324175	0.9324743	111	0.4045038	0.4045284	243
21	-0.0083853	-0.0168425	+435	+0.9324656	+0.9323916	-104	+0.4045244	+0.4044922	+246
22	0.0252982	0.0337521	443	0.9325222	0.9320476	97	0.4044315	0.4043425	248
23	0.0422036	0.0506521	451	0.9317777	0.9314426	89	0.4042251	0.4040794	251
24	0.0590971	0.0675380	459	0.9310422	0.9305767	81	0.4039054	0.4037031	254
25	0.0759741	0.0844051	467	0.9300459	0.9294501	73	0.4034726	0.4032138	257
26	-0.0928301	-0.1012489	+475	+0.9287891	+0.9280631	-65	+0.4029268	+0.4026116	+260
27	0.1096608	0.1180653	482	0.9272721	0.9264161	56	0.4022681	0.4018965	262
28	0.1264618	0.1348498	490	0.9254951	0.9245092	47	0.4014966	0.4010687	265
29	0.1432286	0.1515978	497	0.9234582	0.9223425	38	0.4006125	0.4001283	268
30	0.1599568	0.1683048	504	0.9211617	0.9199163	29	0.3996159	0.3990755	271
31	-0.1766415	-0.1849660	+511	+0.9186060	+0.9172311	-19	+0.3985070	+0.3979105	+273
32	-0.1932780	-0.2015767	+518	+0.9157915	+0.9142873	-10	+0.3972859	+0.3966334	+276



FOR GREENWICH MEAN NOON AND MIDNIGHT.									
Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
July 1	-0.1766415	-0.1849660	+511	+0.9186060	+0.9172311	- 19	+0.3985070	+0.3979105	+273
2	0.1932780	0.2015767	518	0.9157915	0.9142873	- 10	0.3972859	0.3966334	276
3	0.2098616	0.2181320	524	0.9127185	0.9110853	0	0.3959528	0.3952444	279
4	0.2263874	0.2346270	530	0.9093875	0.9076256	+ 10	0.3945079	0.3937437	282
5	0.2428503	0.2510567	536	0.9057993	0.9039090	21	0.3929515	0.3921317	285
6	-0.2592457	-0.2674166	+542	+0.9019547	+0.8999365	+ 31	+0.3912841	+0.3904089	+288
7	0.2755688	0.2837016	547	0.8978547	0.8957092	42	0.3895061	0.3885757	290
8	0.2918143	0.2999064	552	0.8935003	0.8912281	53	0.3876179	0.3866326	293
9	0.3079773	0.3160262	557	0.8888927	0.8864945	65	0.3856198	0.3845799	296
10	0.3240528	0.3320561	562	0.8840335	0.8815101	77	0.3835125	0.3824182	299
11	-0.3400358	-0.3479912	+566	+0.8789243	+0.8762764	+ 89	+0.3812967	+0.3801484	+301
12	0.3559217	0.3638268	570	0.8735665	0.8707950	101	0.3789731	0.3777712	304
13	0.3717059	0.3795585	574	0.8679619	0.8650677	114	0.3765424	0.3752872	306
14	0.3873838	0.3951816	577	0.8621125	0.8590966	126	0.3740054	0.3726972	309
15	0.4029509	0.4106916	580	0.8560202	0.8528836	139	0.3713627	0.3700021	311
16	-0.4184029	-0.4260843	+583	+0.8496869	+0.8464307	+151	+0.3686154	+0.3672028	+314
17	0.4337354	0.4413555	585	0.8431148	0.8397400	164	0.3657643	0.3643002	316
18	0.4489444	0.4565013	587	0.8363060	0.8328137	177	0.3628104	0.3612952	319
19	0.4640360	0.4715177	589	0.8292628	0.8256540	190	0.3597546	0.3581886	322
20	0.4789762	0.4864007	591	0.8219872	0.8182629	203	0.3565979	0.3549819	325
21	-0.4937910	-0.5011464	+592	+0.8144811	+0.8106423	+217	+0.3533411	+0.3516754	+328
22	0.5084665	0.5157508	593	0.8067465	0.8027943	231	0.3499851	0.3482702	331
23	0.5229988	0.5302099	593	0.7987856	0.7947211	244	0.3465309	0.3447673	334
24	0.5373839	0.5445201	593	0.7906007	0.7864249	257	0.3429795	0.3411676	337
25	0.5516183	0.5586779	593	0.7821936	0.7779074	271	0.3393318	0.3374720	339
26	-0.5656984	-0.5726794	+592	+0.7735661	+0.7691705	+285	+0.3355886	+0.3336814	+342
27	0.5796203	0.5865206	591	0.7647203	0.7602163	299	0.3317507	0.3297966	344
28	0.5933799	0.6001976	590	0.7556584	0.7510472	313	0.3278192	0.3258187	347
29	0.6069733	0.6137064	588	0.7463827	0.7416655	327	0.3237951	0.3217487	349
30	0.6203965	0.6270429	586	0.7368956	0.7320735	341	0.3196795	0.3175876	351
31	-0.6336453	-0.6402030	+584	+0.7271993	+0.7222733	+355	+0.3154733	+0.3133364	+353
Aug. 1	0.6467157	0.6531827	581	0.7172959	0.7122673	369	0.3111773	0.3089960	356
2	0.6596037	0.6659781	578	0.7071879	0.7020580	384	0.3067926	0.3045675	358
3	0.6723054	0.6785851	575	0.6968780	0.6916483	398	0.3023205	0.3000522	360
4	0.6848167	0.6909996	571	0.6863692	0.6810410	413	0.2977623	0.2954512	362
5	-0.6971334	-0.7032175	+567	+0.6756642	+0.6702389	+427	+0.2931190	+0.2907658	+365
6	0.7092516	0.7152350	562	0.6647657	0.6592451	441	0.2883919	0.2859973	367
7	0.7211674	0.7270483	557	0.6536772	0.6480629	455	0.2835823	0.2811470	369
8	0.7328774	0.7386540	552	0.6424022	0.6366959	469	0.2786916	0.2762163	371
9	0.7443779	0.7500483	547	0.6309441	0.6251475	483	0.2737213	0.2712068	374
10	-0.7556651	-0.7612277	+541	+0.6193063	+0.6134211	+497	+0.2686731	+0.2661201	+376
11	0.7667357	0.7721888	535	0.6074921	0.6015201	511	0.2635483	0.2609577	378
12	0.7775865	0.7829285	528	0.5955052	0.5894484	524	0.2583484	0.2557209	380
13	0.7882143	0.7934437	521	0.5833495	0.5772096	538	0.2530750	0.2504113	382
14	0.7986162	0.8037317	514	0.5710286	0.5648074	551	0.2477297	0.2450306	384
15	-0.8087895	-0.8137894	+506	+0.5585459	+0.5522452	+565	+0.2423141	+0.2395805	+386
16	-0.8187314	-0.8236148	+498	+0.5459052	+0.5395268	+578	+0.2368296	+0.2340625	+388

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Aug. 16	-0.8187314	-0.8236148	+498	+0.5459052	+0.5395268	+578	+0.2368298	+0.2340625	+388
17	0.8284391	0.8332042	490	0.5331101	0.5266559	591	0.2312785	0.2284783	390
18	0.8379100	0.8425560	481	0.5201644	0.5136362	604	0.2256618	0.2228294	391
19	0.8471420	0.8516676	472	0.5070717	0.5004713	617	0.2199812	0.2171174	393
20	0.8561326	0.8605364	462	0.4938353	0.4871644	630	0.2142382	0.2113439	394
21	-0.8648791	-0.8691601	+452	+0.4804588	+0.4737191	+643	+0.2084346	+0.2055105	+396
22	0.8733793	0.8775364	442	0.4669456	0.4601389	655	0.2025717	0.1996186	397
23	0.8816309	0.8856627	432	0.4532993	0.4464274	668	0.1966511	0.1936698	398
24	0.8896314	0.8935366	421	0.4395234	0.4325881	680	0.1906744	0.1876656	399
25	0.8973782	0.9011557	410	0.4256215	0.4186245	692	0.1846432	0.1816077	401
26	-0.9048690	-0.9085176	+399	+0.4115972	+0.4045403	+703	+0.1785591	+0.1754977	+402
27	0.9121014	0.9158199	388	0.3974540	0.3903389	715	0.1724236	0.1693370	403
28	0.9190730	0.9224602	376	0.3831953	0.3760239	726	0.1662380	0.1631271	404
29	0.9257813	0.9290358	364	0.3688251	0.3615995	737	0.1600041	0.1568697	405
30	0.9322236	0.9353443	351	0.3543474	0.3470695	748	0.1537237	0.1505667	406
31	-0.9383076	-0.9413834	+339	+0.3397662	+0.3324380	+759	+0.1473986	+0.1442199	+407
Sept. 1	0.9443013	0.9471510	326	0.3250854	0.3177091	769	0.1410305	0.1378310	408
2	0.9499322	0.9526446	313	0.3103095	0.3028873	780	0.1346212	0.1314018	409
3	0.9552880	0.9578620	299	0.2954430	0.2879771	790	0.1281725	0.1249340	410
4	0.9603666	0.9628014	286	0.2804901	0.2729827	799	0.1216862	0.1184296	411
5	-0.9651662	-0.9674609	+272	+0.2654553	+0.2579086	+809	+0.1151642	+0.1118905	+411
6	0.9696851	0.9718389	258	0.2503431	0.2427594	819	0.1086084	0.1053187	412
7	0.9739218	0.9759339	243	0.2351581	0.2275398	828	0.1020211	0.0987163	412
8	0.9778747	0.9797445	229	0.2199051	0.2122546	837	0.0954042	0.0920853	412
9	0.9815425	0.9832693	214	0.2045888	0.1969085	845	0.0887597	0.0854277	413
10	-0.9849242	-0.9865075	+199	+0.1892140	+0.1815061	+853	+0.0820895	+0.0787455	+413
11	0.9880188	0.9894582	183	0.1737852	0.1660521	861	0.0753957	0.0720407	413
12	0.9908253	0.9921203	168	0.1583071	0.1505511	869	0.0686804	0.0653154	413
13	0.9933428	0.9944931	152	0.1427845	0.1350080	876	0.0619457	0.0585717	413
14	0.9955707	0.9965760	136	0.1272220	0.1194272	883	0.0551936	0.0518116	413
15	-0.9975087	-0.9983690	+120	+0.1116239	+0.1038129	+890	+0.0484260	+0.0450370	+412
16	0.9991566	0.9998717	104	0.0959945	0.0881695	897	0.0416448	0.0382498	412
17	1.0005139	1.0010836	87	0.0803383	0.0725015	903	0.0348520	0.0314519	412
18	1.0015803	1.0020042	70	0.0646596	0.0568132	909	0.0290495	0.0246453	411
19	1.0023553	1.0026334	53	0.0489629	0.0411091	915	0.0212393	0.0178319	410
20	-1.0028386	-1.0020707	+ 36	+0.0332524	+0.0253933	+921	+0.0144232	+0.0110136	+409
21	1.0030298	1.0030158	19	0.0175323	+0.0096699	926	0.0076031	+0.0041921	408
22	1.0029286	1.0027683	+ 2	+0.0018067	-0.0060569	931	+0.0007807	-0.0026307	407
23	1.0025347	1.0022279	- 16	-0.0139202	0.0217827	936	-0.0060420	0.0094529	406
24	1.0018478	1.0013944	33	0.0296438	0.0375030	941	0.0128632	0.0162726	405
25	-1.0008675	-1.0002674	- 51	-0.0453596	-0.0532133	+945	-0.0196809	-0.0230878	+403
26	0.9995938	0.9988469	69	0.0610632	0.0689092	949	0.0264931	0.0298966	402
27	0.9980266	0.9971328	87	0.0767504	0.0845866	953	0.0323981	0.0366972	400
28	0.9961655	0.9951247	105	0.0924169	0.1002410	956	0.0400940	0.0434878	398
29	0.9940103	0.9928224	123	0.1080580	0.1158674	959	0.0468788	0.0502663	396
30	-0.9915609	-0.9902260	-141	-0.1236685	-0.1314606	+962	-0.0536504	-0.0570305	+394
31	-0.9888176	-0.9873359	-160	-0.1392433	-0.1470158	+964	-0.0604066	-0.0637783	+392

FOR GREENWICH MEAN NOON AND MIDNIGHT.										
Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.		
Oct.	1	-0.9888176	-0.9873359	- 160	-0.1392433	-0.1470158	+964	-0.0604066	-0.0637783	+392
	2	0.9857809	0.9841526	178	0.1547777	0.1625283	966	0.0671454	0.0705076	390
	3	0.9824511	0.9806765	197	0.1702670	0.1779932	968	0.0738647	0.0772164	387
	4	0.9788289	0.9769084	216	0.1857063	0.1934056	970	0.0805625	0.0839026	385
	5	0.9749150	0.9728490	235	0.2010905	0.2087605	971	0.0872365	0.0905639	382
	6	-0.9707102	-0.9684992	- 254	-0.2164148	-0.2240530	+972	-0.0938845	-0.0971982	+379
	7	0.9662157	0.9638603	273	0.2316743	0.2392782	972	0.1005046	0.1038035	376
	8	0.9614328	0.9589339	292	0.2468641	0.2544312	973	0.1070946	0.1103776	373
	9	0.9563632	0.9537215	311	0.2619791	0.2695070	973	0.1136522	0.1169183	370
	10	0.9510085	0.9482247	330	0.2770145	0.2845009	973	0.1201755	0.1234236	367
	11	-0.9453701	-0.9424451	- 349	-0.2919658	-0.2994085	+972	-0.1266625	-0.1298916	+363
	12	0.9394497	0.9363845	368	0.3068284	0.3142252	971	0.1331111	0.1363203	360
	13	0.9332493	0.9300449	388	0.3215981	0.3289468	970	0.1395193	0.1427077	356
	14	0.9267710	0.9234264	407	0.3362707	0.3435692	969	0.1458853	0.1490519	353
	15	0.9200169	0.9165371	427	0.3508418	0.3580879	967	0.1522073	0.1553511	349
	16	-0.9129889	-0.9093730	- 446	-0.3653070	-0.3724986	+965	-0.1584833	-0.1616034	+345
	17	0.9056892	0.9019380	466	0.3796621	0.3867971	963	0.1647114	0.1678070	341
	18	0.8981195	0.8942341	485	0.3939032	0.4009797	960	0.1708899	0.1739601	337
	19	0.8902819	0.8862634	505	0.4080264	0.4150425	957	0.1770172	0.1800610	332
	20	0.8821786	0.8780281	524	0.4220277	0.4289813	954	0.1830914	0.1861080	328
	21	-0.8738118	-0.8695302	- 544	-0.4359030	-0.4427920	+951	-0.1891107	-0.1920993	+323
	22	0.8651834	0.8607719	564	0.4496482	0.4564707	947	0.1950734	0.1980331	318
	23	0.8562956	0.8517552	584	0.4632594	0.4700134	943	0.2009779	0.2039078	313
	24	0.8471506	0.8424822	603	0.4767326	0.4834161	939	0.2068224	0.2097216	308
	25	0.8377501	0.8329548	623	0.4900636	0.4966746	934	0.2126051	0.2154728	303
	26	-0.8280964	-0.8231755	- 643	-0.5032484	-0.5097847	+929	-0.2183244	-0.2211597	+298
	27	0.8181923	0.8131471	663	0.5162828	0.5227422	924	0.2239784	0.2267803	292
	28	0.8080403	0.8028720	683	0.5291624	0.5355427	919	0.2295652	0.2323328	287
	29	0.7976426	0.7923525	703	0.5418828	0.5481819	913	0.2350830	0.2378154	281
	30	0.7870019	0.7815914	723	0.5544396	0.5606555	907	0.2405300	0.2432264	275
Nov.	31	-0.7761213	-0.7705920	- 743	-0.5668289	-0.5729595	+900	-0.2459044	-0.2485639	+269
	1	0.7650041	0.7593577	763	0.5790467	0.5850899	893	0.2512045	0.2538262	263
	2	0.7536533	0.7478913	783	0.5910886	0.5970422	886	0.2564286	0.2590115	257
	3	0.7420720	0.7361961	803	0.6029504	0.6088125	878	0.2615747	0.2641180	251
	4	0.7302637	0.7242757	822	0.6146281	0.6203968	870	0.2666410	0.2691438	244
	5	-0.7182322	-0.7121340	- 842	-0.6261180	-0.6317913	+862	-0.2716259	-0.2740873	+238
	6	0.7059813	0.6997749	861	0.6374161	0.6429920	853	0.2765277	0.2789469	231
	7	0.6935150	0.6872024	881	0.6485185	0.6539952	844	0.2813448	0.2837211	225
	8	0.6808374	0.6744205	900	0.6594217	0.6647976	834	0.2860756	0.2884082	218
	9	0.6679524	0.6614335	919	0.6701224	0.6753958	824	0.2907186	0.2930067	211
	10	-0.6548643	-0.6482455	- 938	-0.6806173	-0.6857865	+814	-0.2952723	-0.2975152	+204
	11	0.6415775	0.6348608	957	0.6909031	0.6959665	804	0.2997351	0.3019321	197
	12	0.6280961	0.6212834	976	0.7009766	0.7059329	793	0.3041057	0.3062562	190
	13	0.6144238	0.6075174	995	0.7108351	0.7156829	782	0.3083830	0.3104863	183
	14	0.6005649	0.5935668	1014	0.7204759	0.7252139	770	0.3125657	0.3146212	175
	15	-0.5865237	-0.5794361	-1033	-0.7298964	-0.7345232	+758	-0.3166526	-0.3186598	+167
16	-0.5723045	-0.5651295	-1052	-0.7390939	-0.7436081	+746	-0.3206426	-0.3226010	+159	

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Date.	X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox		Reduc. to Mean Eq'x of Jan. 0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Nov. 16	-0.5723045	-0.5651295	-1052	-0.7390939	-0.7436081	+746	-0.3206426	-0.3226010	+159
17	0.5579115	0.5506511	1071	0.7480655	0.7524658	733	0.3245345	0.3264434	151
18	0.5433486	0.5360048	1089	0.7568085	0.7610935	720	0.3283272	0.3301860	142
19	0.5286197	0.5211945	1107	0.7653203	0.7694888	707	0.3320195	0.3338277	134
20	0.5137292	0.5062246	1125	0.7735984	0.7776490	693	0.3356192	0.3373672	125
21	-0.4986811	-0.4910993	-1143	-0.7816401	-0.7855716	+679	-0.3390983	-0.3408036	+117
22	0.4834796	0.4758226	1161	0.7894429	0.7932540	664	0.3424827	0.3441357	108
23	0.4681287	0.4603986	1179	0.7970043	0.8006937	649	0.3457623	0.3473625	100
24	0.4526329	0.4448320	1196	0.8043217	0.8078881	634	0.3489361	0.3504829	91
25	0.4369967	0.4291272	1214	0.8113925	0.8148346	618	0.3520029	0.3534959	82
26	-0.4212243	-0.4132885	-1231	-0.8182140	-0.8215306	+602	-0.3549617	-0.3564003	+ 73
27	0.4053202	0.3973205	1248	0.8247837	0.8279734	585	0.3578114	0.3591951	64
28	0.3892896	0.3812284	1265	0.8310991	0.8341606	568	0.3605509	0.3618790	55
29	0.3731374	0.3650172	1281	0.8371576	0.8400897	551	0.3631791	0.3644511	46
30	0.3568683	0.3486916	1297	0.8429568	0.8457585	533	0.3656949	0.3669104	37
Dec. 1	-0.3404874	-0.3322567	-1313	-0.8484948	-0.8511651	+515	-0.3680976	-0.3692562	+ 28
2	0.3239999	0.3157181	1328	0.8537696	0.8563075	496	0.3703863	0.3714876	18
3	0.3074113	0.2990810	1344	0.8587792	0.8611838	477	0.3725601	0.3736036	+ 9
4	0.2907272	0.2823511	1359	0.8635216	0.8657921	458	0.3746181	0.3756033	- 1
5	0.2739530	0.2655339	1374	0.8679952	0.8701308	438	0.3765594	0.3774861	11
6	-0.2570941	-0.2486349	-1388	-0.8721985	-0.8741985	+418	-0.3783835	-0.3792514	- 21
7	0.2401564	0.2316598	1402	0.8761302	0.8779939	398	0.3800899	0.3808987	30
8	0.2231453	0.2146139	1416	0.8797891	0.8815160	377	0.3816779	0.3824274	40
9	0.2060660	0.1975026	1429	0.8831742	0.8847638	356	0.3831470	0.3838369	50
10	0.1889239	0.1803313	1442	0.8862846	0.8877366	334	0.3844970	0.3851271	60
11	-0.1717248	-0.1631057	-1455	-0.8891197	-0.8904338	+312	-0.3857274	-0.3862976	- 70
12	0.1544741	0.1458312	1467	0.8916789	0.8928549	290	0.3868379	0.3873481	80
13	0.1371773	0.1285132	1479	0.8939617	0.8949993	267	0.3878283	0.3882784	90
14	0.1198395	0.1111568	1490	0.8959676	0.8968666	244	0.3886084	0.3890883	101
15	0.1024658	0.0937671	1501	0.8976962	0.8984564	221	0.3894480	0.3897776	111
16	-0.0850614	-0.0763492	-1511	-0.8991470	-0.8997682	+197	-0.3900770	-0.3903462	-122
17	0.0676313	0.0589082	1521	0.9003197	0.9008017	173	0.3905852	0.3907940	132
18	0.0501805	0.0414491	1531	0.9012140	0.9015566	148	0.3909725	0.3911208	143
19	0.0327142	0.0239768	1541	0.9018296	0.9020327	123	0.3912389	0.3913267	154
20	-0.0152373	-0.0064965	1550	0.9021663	0.9022298	97	0.3913843	0.3914116	165
21	+0.0022452	+0.0109868	-1559	-0.9022237	-0.9021475	+ 72	-0.3914086	-0.3913753	-176
22	0.0197280	0.0284677	1567	0.9020015	0.9017855	46	0.3913116	0.3912177	187
23	0.0372058	0.0459412	1574	0.9014995	0.9011436	+ 20	0.3910933	0.3909388	197
24	0.0546736	0.0634021	1581	0.9007175	0.9002217	- 7	0.3907538	0.3905386	208
25	0.0721262	0.0808450	1588	0.8996556	0.8990197	33	0.3902929	0.3900170	218
26	+0.0895579	+0.0982641	-1594	-0.8983137	-0.8975376	- 60	-0.3897106	-0.3893740	-229
27	0.1069630	0.1156539	1599	0.8966916	0.8957756	87	0.3890069	0.3886096	240
28	0.1243360	0.1330089	1604	0.8947895	0.8937337	114	0.3881819	0.3877240	251
29	0.1416717	0.1503238	1608	0.8926078	0.8914124	141	0.3872358	0.3867175	262
30	0.1589646	0.1675931	1611	0.8901471	0.8888123	169	0.3861689	0.3855902	273
31	+0.1762069	+0.1848109	-1614	-0.8874078	-0.8859340	-196	-0.3849812	-0.3843422	-284
32	+0.1933986	+0.2019712	-1617	-0.8843907	-0.8827783	-223	-0.3836730	-0.3829739	-295

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	JANUARY.		Day of Month.	FEBRUARY.		Day of Month.	MARCH.	
	True Longitude.	Latitude.		True Longitude.	Latitude.		True Longitude.	Latitude.
1.0	126° 46' 52.4	-0° 16' 41.3	1.0	178° 12' 14.1	+3° 57' 51.3	1.0	202° 35' 1.9	+4° 58' 46.0
1.5	133 30 8.5	+0 20 9.3	1.5	185 21 53.5	4 22 7.6	1.5	209 57 21.6	5 7 45.4
2.0	140 16 10.4	0 56 59.6	2.0	192 31 48.5	4 42 18.6	2.0	217 17 22.7	5 11 39.1
2.5	147 4 50.5	1 33 17.0	2.5	199 41 30.6	4 58 5.0	2.5	224 34 21.9	5 10 28.7
3.0	153 56 1.5	2 8 28.2	3.0	206 50 33.8	5 9 12.1	3.0	231 47 44.2	5 4 22.4
3.5	160 49 36.6	+2 42 0.4	3.5	213 58 34.9	+5 15 31.2	3.5	238 57 2.7	+4 53 34.2
4.0	167 45 29.1	3 13 21.5	4.0	221 5 13.5	5 16 58.8	4.0	246 1 58.5	4 38 22.5
4.5	174 43 32.5	3 42 0.9	4.5	228 10 12.1	5 13 37.0	4.5	253 2 20.9	4 19 9.6
5.0	181 43 39.5	4 7 30.1	5.0	235 13 15.6	5 5 32.3	5.0	259 58 6.0	3 56 20.6
5.5	188 45 42.1	4 29 23.0	5.5	242 14 11.2	4 52 55.9	5.5	266 49 15.3	3 30 22.3
6.0	195 49 30.3	+4 47 16.7	6.0	249 12 48.0	+4 36 3.3	6.0	273 35 55.4	+3 1 42.9
6.5	202 54 52.2	5 0 51.7	6.5	256 8 56.6	4 15 14.0	6.5	280 18 16.2	2 30 51.1
7.0	210 1 33.2	5 9 52.7	7.0	263 2 28.8	3 50 50.1	7.0	286 56 30.1	1 58 15.8
7.5	217 9 15.7	5 14 9.0	7.5	269 53 16.9	3 23 16.9	7.5	293 30 50.7	1 24 25.8
8.0	224 17 38.8	5 13 34.6	8.0	276 41 14.2	2 53 2.2	8.0	300 1 32.3	0 49 49.5
8.5	231 26 18.4	+5 8 8.8	8.5	283 26 14.1	+2 20 35.1	8.5	306 28 48.9	+0 14 54.2
9.0	238 34 46.9	4 57 56.8	9.0	290 8 10.5	1 46 26.3	9.0	312 52 53.6	-0 19 53.3
9.5	245 42 34.5	4 43 8.9	9.5	296 46 57.7	1 11 6.7	9.5	319 13 59.4	0 54 7.5
10.0	252 49 9.2	4 24 1.1	10.0	303 22 30.3	+0 35 7.4	10.0	325 32 16.6	1 27 24.1
10.5	259 53 58.0	4 0 54.5	10.5	309 54 43.8	-0 1 0.9	10.5	331 47 55.2	1 59 20.7
11.0	266 56 27.8	+3 34 14.7	11.0	316 23 34.9	-0 36 49.1	11.0	338 1 4.1	-2 29 36.4
11.5	273 56 6.2	3 4 31.2	11.5	322 49 1.5	1 11 49.3	11.5	344 11 51.0	2 57 52.0
12.0	280 52 23.4	2 32 16.2	12.0	329 11 3.2	1 45 35.7	12.0	350 20 23.2	3 23 50.6
12.5	287 44 52.5	1 58 4.0	12.5	335 29 41.6	2 17 44.8	12.5	356 26 47.8	3 47 17.2
13.0	294 33 10.7	1 22 29.5	13.0	341 45 0.6	2 47 56.1	13.0	2 31 12.0	4 7 59.1
13.5	301 16 59.7	+0 46 7.5	13.5	347 57 6.9	-3 15 51.2	13.5	8 33 44.2	-1 25 45.6
14.0	307 56 6.6	+0 9 31.3	14.0	354 6 9.5	3 41 14.6	14.0	14 34 33.4	4 40 28.4
14.5	314 30 24.1	-0 26 47.3	14.5	0 12 20.7	4 3 53.3	14.5	20 33 50.3	4 52 1.0
15.0	320 59 50.5	1 2 19.3	15.0	6 15 55.7	4 23 36.7	15.0	26 31 47.6	5 0 18.8
15.5	327 24 29.6	1 36 38.2	15.5	12 17 12.4	4 40 16.3	15.5	32 28 40.0	5 5 19.0
16.0	333 44 30.5	-2 9 21.2	16.0	18 16 31.6	-4 53 45.9	16.0	38 24 44.9	-5 7 0.5
16.5	340 0 7.3	2 40 8.0	16.5	24 14 17.3	5 4 0.4	16.5	44 20 22.1	5 5 23.6
17.0	346 11 38.4	3 8 41.6	17.0	30 10 55.8	5 10 56.6	17.0	50 15 54.1	5 0 29.8
17.5	352 19 26.6	3 34 47.5	17.5	36 6 56.0	5 14 32.3	17.5	56 11 46.3	4 52 21.8
18.0	358 23 58.0	3 58 13.7	18.0	42 2 48.7	5 14 46.5	18.0	62 8 26.8	4 41 3.2
18.5	4 25 41.6	-4 18 50.2	18.5	47 59 6.6	-5 11 38.8	18.5	68 6 26.0	-4 26 38.7
19.0	10 25 8.9	4 36 28.8	19.0	53 56 23.9	5 5 9.7	19.0	74 6 16.5	4 9 14.0
19.5	16 22 53.1	4 51 2.8	19.5	59 55 16.1	4 55 20.7	19.5	80 8 32.9	3 48 55.7
20.0	22 19 29.1	5 2 26.5	20.0	65 56 19.0	4 42 13.9	20.0	86 13 51.3	3 25 51.7
20.5	28 15 32.5	5 10 35.4	20.5	72 0 8.5	4 25 52.7	20.5	92 22 48.9	3 0 11.4
21.0	34 11 39.3	-5 15 25.6	21.0	78 7 20.2	-4 6 21.6	21.0	98 36 2.8	-2 32 5.6
21.5	40 8 25.6	5 16 53.8	21.5	84 18 28.5	3 43 46.8	21.5	104 54 9.7	2 1 47.8
22.0	46 6 26.7	5 14 57.8	22.0	90 34 5.9	3 18 16.2	22.0	111 17 44.6	1 29 33.1
22.5	52 6 16.9	5 9 35.8	22.5	96 54 42.2	2 50 0.4	22.5	117 47 20.0	0 55 40.0
23.0	58 8 29.3	5 0 47.1	23.0	103 20 43.8	2 19 12.6	23.0	124 23 24.3	-0 20 30.1
23.5	64 13 34.7	-4 48 32.1	23.5	109 52 32.1	-1 46 9.5	23.5	131 6 20.3	+0 15 31.4
24.0	70 22 1.5	4 32 52.8	24.0	116 30 23.1	1 11 11.6	24.0	137 56 23.6	0 51 55.5
24.5	76 34 14.9	4 13 52.7	24.5	123 14 26.4	-0 34 43.2	24.5	144 53 41.0	1 28 9.3
25.0	82 50 36.8	3 51 38.1	25.0	130 4 43.4	+0 2 47.0	25.0	151 58 8.7	2 3 36.8
25.5	89 11 24.8	3 26 17.2	25.5	137 1 7.5	0 40 46.3	25.5	159 9 31.4	2 37 38.8
26.0	95 36 52.2	-2 58 2.0	26.0	144 3 23.0	+1 18 38.5	26.0	166 27 21.1	+3 9 34.4
26.5	102 7 7.4	2 27 7.6	26.5	151 11 4.8	1 55 44.3	26.5	173 50 56.7	3 38 42.5
27.0	108 42 13.5	1 53 52.9	27.0	158 23 39.1	2 31 22.6	27.0	181 19 24.4	4 4 23.5
27.5	115 22 8.6	1 18 40.7	27.5	165 40 23.3	3 4 52.0	27.5	188 51 39.6	4 26 1.1
28.0	122 6 45.1	0 41 57.8	28.0	173 0 27.7	3 35 32.1	28.0	196 26 28.6	4 43 4.4
28.5	128 55 50.2	-0 4 14.5	28.5	180 22 57.0	4 2 45.6	28.5	204 2 32.0	4 55 9.6
29.0	135 49 6.2	+0 33 55.7	29.0	187 46 52.4	+4 25 59.4	29.0	211 38 27.9	+5 2 1.4
29.5	142 46 11.1	1 11 56.6	29.5	195 11 13.6	4 44 46.4	29.5	219 12 56.0	5 3 33.4
30.0	149 46 38.9	1 49 10.6	30.0	202 35 1.9	4 58 46.0	30.0	226 44 41.3	4 59 48.4
30.5	156 50 0.7	2 24 59.7	30.5	209 57 21.6	5 7 45.4	30.5	234 12 37.4	4 50 57.5
31.0	163 55 45.4	2 58 46.2	31.0	217 17 22.7	5 11 39.1	31.0	241 35 48.3	4 37 19.4
31.5	171 3 20.8	+3 29 54.4	31.5	224 34 21.9	+5 10 28.7	31.5	248 53 30.0	+4 19 18.5

# MOON'S LONGITUDE AND LATITUDE, 1888. 273

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	APRIL.		Day of Month.	MAY.		Day of Month.	JUNE.	
	True Longitude.	Latitude.		True Longitude.	Latitude.		True Longitude.	Latitude.
1.0	256° 5' 11.7"	+3° 57' 23.5"	1.0	293° 14' 1.5"	+0° 58' 18.8"	1.0	340° 55' 52.4"	-3° 14' 35.1"
1.5	263 10 34.7	3 32 5.9	1.5	299 57 9.9	+0 23 6.7	1.5	347 7 48.5	3 39 13.4
2.0	270 9 31.9	3 3 58.7	2.0	306 33 42.0	-0 11 50.7	2.0	353 15 48.7	4 1 3.8
2.5	277 2 6.0	2 33 34.9	2.5	313 4 4.9	0 46 6.7	2.5	359 20 28.3	4 19 57.9
3.0	283 48 27.7	2 1 27.1	3.0	319 28 49.4	1 19 17.7	3.0	5 22 21.4	4 35 49.1
3.5	290 28 54.6	+1 28 6.5	3.5	325 48 28.3	-1 51 3.0	3.5	11 22 0.8	-4 48 32.1
4.0	297 3 48.8	0 54 2.6	4.0	332 3 35.7	2 21 4.2	4.0	17 19 57.8	4 58 2.6
4.5	303 33 35.5	+0 19 43.3	4.5	338 14 45.5	2 49 5.1	4.5	23 16 41.8	5 4 17.7
5.0	309 58 41.6	-0 14 25.4	5.0	344 22 30.4	3 14 51.5	5.0	29 12 39.2	5 7 15.6
5.5	316 19 34.9	0 47 59.4	5.5	350 27 21.7	3 38 11.0	5.5	35 8 14.8	5 6 55.1
6.0	322 36 42.5	-1 20 36.5	6.0	356 29 48.7	-3 58 52.6	6.0	41 3 50.4	-5 3 16.5
6.5	328 50 30.3	1 51 56.0	6.5	2 30 18.2	4 16 46.8	6.5	46 59 46.2	4 56 21.6
7.0	335 1 22.7	2 21 39.1	7.0	8 29 14.5	4 31 45.5	7.0	52 56 19.6	4 46 13.4
7.5	341 9 41.9	2 49 28.3	7.5	14 26 59.2	4 43 41.7	7.5	58 53 45.9	4 32 56.4
8.0	347 15 47.8	3 15 7.8	8.0	20 23 51.6	4 52 30.1	8.0	64 52 19.2	4 16 36.7
8.5	353 19 58.0	-3 38 23.5	8.5	26 20 8.5	-4 58 6.5	8.5	70 52 11.9	-3 57 22.4
9.0	359 22 27.9	3 59 2.9	9.0	32 16 4.6	5 0 28.3	9.0	76 53 35.2	3 35 23.2
9.5	5 23 30.9	4 16 55.0	9.5	38 11 52.9	4 59 34.5	9.5	82 56 39.8	3 10 50.7
10.0	11 23 18.7	4 31 50.6	10.0	44 7 45.1	4 55 25.6	10.0	89 1 35.9	2 43 58.5
10.5	17 22 1.8	4 43 42.3	10.5	50 3 51.9	4 48 3.7	10.5	95 8 34.0	2 15 2.0
11.0	23 19 49.7	-4 52 24.5	11.0	56 0 23.8	-4 37 32.6	11.0	101 17 45.1	-1 44 18.4
11.5	29 16 51.9	4 57 53.1	11.5	61 57 31.2	4 23 57.8	11.5	107 29 20.5	1 12 6.6
12.0	35 13 17.9	5 0 6.3	12.0	67 55 25.1	4 7 26.3	12.0	113 43 33.0	0 38 47.3
12.5	41 9 18.0	4 59 3.4	12.5	73 54 17.4	3 48 6.9	12.5	120 0 36.1	-0 4 42.3
13.0	47 5 3.6	4 54 45.8	13.0	79 54 21.9	3 26 9.9	13.0	126 20 44.8	+0 29 44.9
13.5	53 0 47.7	-4 47 16.3	13.5	85 55 53.9	-3 1 47.1	13.5	132 44 15.1	+1 4 9.5
14.0	58 56 45.4	4 36 39.1	14.0	91 59 10.7	2 35 11.8	14.0	139 11 23.8	1 38 5.9
14.5	64 53 14.2	4 23 0.0	14.5	98 4 32.0	2 6 38.8	14.5	145 42 28.4	2 11 7.4
15.0	70 50 34.2	4 6 25.9	15.0	104 12 20.0	1 36 24.2	15.0	152 17 46.0	2 42 46.7
15.5	76 49 8.1	3 47 4.9	15.5	110 22 58.8	1 4 45.3	15.5	158 57 33.2	3 12 35.8
16.0	82 49 21.3	-3 25 6.3	16.0	116 36 55.0	-0 32 1.1	16.0	165 42 4.5	+3 40 6.4
16.5	88 51 42.1	3 0 40.8	16.5	122 54 36.6	+0 1 27.9	16.5	172 31 32.0	4 4 50.5
17.0	94 56 41.4	2 34 0.2	17.0	129 16 32.8	0 35 19.7	17.0	179 26 3.7	4 26 20.3
17.5	101 4 52.1	2 5 17.7	17.5	135 43 13.1	1 9 10.6	17.5	186 25 42.5	4 44 9.3
18.0	107 16 48.6	1 34 47.9	18.0	142 15 6.5	1 42 35.2	18.0	193 30 24.9	4 57 52.9
18.5	113 33 6.6	-1 2 47.4	18.5	148 52 40.4	+2 15 6.3	18.5	200 40 0.4	+5 7 9.2
19.0	119 54 22.3	-0 29 34.7	19.0	155 36 18.9	2 46 14.9	19.0	207 54 9.8	5 11 39.9
19.5	126 21 10.7	+0 4 29.5	19.5	162 26 21.6	3 15 30.6	19.5	215 12 25.3	5 11 11.7
20.0	132 54 5.0	0 39 1.8	20.0	169 23 1.6	3 42 21.8	20.0	222 34 10.1	5 5 36.9
20.5	139 33 35.0	1 13 36.0	20.5	176 26 23.9	4 6 16.1	20.5	229 58 39.2	4 54 54.8
21.0	146 20 5.3	+1 47 43.1	21.0	183 36 23.7	+4 26 41.7	21.0	237 25 0.0	+4 39 12.4
21.5	153 13 53.7	2 20 51.2	21.5	190 52 44.6	4 43 8.0	21.5	244 52 14.1	4 18 43.9
22.0	160 15 8.8	2 52 25.9	22.0	198 14 57.5	4 55 7.1	22.0	252 19 19.6	3 53 51.4
22.5	167 23 48.3	3 21 50.6	22.5	205 42 21.0	5 2 15.6	22.5	259 45 13.4	3 25 4.0
23.0	174 39 37.6	3 48 28.0	23.0	213 14 1.0	5 4 15.9	23.0	267 8 53.4	2 52 56.7
23.5	182 2 7.8	+4 11 40.9	23.5	220 48 51.5	+5 0 57.7	23.5	274 29 21.2	+2 18 9.4
24.0	189 30 35.6	4 30 54.0	24.0	228 25 38.2	4 52 19.6	24.0	281 45 44.2	1 41 23.5
24.5	197 4 3.7	4 45 35.9	24.5	236 3 0.7	4 38 28.8	24.5	288 57 17.4	1 3 22.1
25.0	204 41 21.9	4 55 20.9	25.0	243 39 36.5	4 19 42.2	25.0	296 3 24.5	+0 24 48.1
25.5	212 21 9.7	4 59 51.0	25.5	251 14 4.2	3 56 24.9	25.5	303 3 38.3	-0 13 38.3
26.0	220 1 59.5	+4 58 57.0	26.0	258 45 8.1	+3 29 9.2	26.0	309 57 41.4	-0 51 20.3
26.5	227 42 21.4	4 52 39.4	26.5	266 11 40.5	2 58 32.9	26.5	316 45 25.5	1 27 45.1
27.0	235 20 47.0	4 41 8.3	27.0	273 32 44.8	2 25 17.2	27.0	323 26 50.6	2 2 24.2
27.5	242 55 53.5	4 24 43.0	27.5	280 47 36.3	1 50 4.8	27.5	330 2 4.7	2 34 53.5
28.0	250 26 27.9	4 3 50.2	28.0	287 55 43.5	1 13 37.9	28.0	336 31 22.5	3 4 53.2
28.5	257 51 29.4	3 39 2.7	28.5	294 56 47.6	+0 36 36.7	28.5	342 55 4.6	3 32 7.7
29.0	265 10 10.7	+3 10 57.0	29.0	301 50 41.6	-0 0 21.5	29.0	349 13 35.8	-3 56 24.7
29.5	272 21 59.1	2 40 11.6	29.5	308 37 28.9	0 36 43.4	29.5	355 27 24.4	4 17 34.8
30.0	279 26 35.9	2 7 25.4	30.0	315 17 22.2	1 11 59.6	30.0	1 37 1.7	4 35 31.3
30.5	286 23 54.9	1 33 16.0	30.5	321 50 41.5	1 45 44.7	30.5	7 43 0.6	4 50 9.3
31.0	293 14 1.5	0 58 18.8	31.0	328 17 52.6	2 17 37.1	31.0	13 45 55.1	5 1 25.8
31.5	299 57 9.9	+0 23 6.7	31.5	334 39 25.3	-2 47 18.9	31.5	19 46 19.5	-5 9 19.0

FOR GREENWICH MEAN NOON AND MIDNIGHT.								
Day of Month.	JULY.		Day of Month.	AUGUST.		Day of Month.	SEPTEMBER.	
	True Longitude.	Latitude.		True Longitude.	Latitude.		True Longitude.	Latitude.
1.0	13° 45' 55.1	-5° 1' 25.8	1.0	57° 34' 42.9	-4° 42' 2.5	1.0	101° 43' 21.8	-1° 37' 13.9
1.5	19 46 19.5	5 9 19.0	1.5	63 32 3.2	4 25 35.2	1.5	107 57 46.5	1 4 28.4
2.0	25 44 48.1	5 13 48.3	2.0	69 30 44.0	4 6 11.3	2.0	114 16 59.2	-0 30 31.9
2.5	31 41 54.5	5 14 54.0	2.5	75 31 16.7	3 43 59.3	2.5	120 41 23.6	+0 4 13.6
3.0	37 38 11.2	5 12 37.1	3.0	81 34 10.8	3 19 9.0	3.0	127 11 17.8	0 39 23.4
3.5	43 34 9.3	-5 6 59.9	3.5	87 39 53.6	-2 51 52.1	3.5	133 46 54.1	+1 14 30.1
4.0	49 30 18.2	4 58 5.3	4.0	93 48 49.5	2 22 22.0	4.0	140 28 17.7	1 49 3.8
4.5	55 27 5.5	4 45 57.3	4.5	100 1 19.8	1 50 54.4	4.5	147 15 26.1	2 22 32.3
5.0	61 24 56.7	4 30 41.2	5.0	106 17 42.5	1 17 47.9	5.0	154 8 8.8	2 54 21.7
5.5	67 24 14.9	4 12 23.7	5.5	112 38 11.6	0 43 23.1	5.5	161 6 7.0	3 23 57.7
6.0	73 25 20.9	-3 51 12.8	6.0	119 2 57.3	-0 8 2.9	6.0	168 8 54.0	+3 50 46.2
6.5	79 28 33.0	3 27 18.6	6.5	125 32 5.3	+0 27 46.5	6.5	175 15 55.4	4 14 14.8
7.0	85 34 7.5	3 0 53.1	7.0	132 5 36.9	1 3 37.0	7.0	182 26 30.4	4 33 53.8
7.5	91 42 18.1	2 32 10.4	7.5	138 43 28.9	1 38 58.3	7.5	189 39 53.5	4 49 18.0
8.0	97 53 16.4	2 1 26.6	8.0	145 25 33.9	2 13 19.3	8.0	196 55 15.9	5 0 7.1
8.5	104 7 11.9	-1 29 0.3	8.5	152 11 40.3	+2 46 7.1	8.5	204 11 47.3	+5 6 7.1
9.0	110 24 12.5	0 55 12.3	9.0	159 1 32.7	3 16 49.7	9.0	211 28 34.4	5 7 10.5
9.5	116 44 24.1	-0 20 25.4	9.5	165 54 52.7	3 44 55.6	9.5	218 45 2.4	5 3 16.4
10.0	123 7 51.6	+0 14 55.6	10.0	172 51 19.1	4 9 54.8	10.0	226 0 17.3	4 54 30.8
10.5	129 34 38.4	0 50 24.2	10.5	179 50 28.8	4 31 20.2	10.5	233 13 46.1	4 41 5.5
11.0	136 4 47.1	+1 25 32.6	11.0	186 51 57.3	+4 48 48.0	11.0	240 24 58.2	+4 23 17.9
11.5	142 38 19.3	1 59 52.0	11.5	193 55 19.6	5 1 58.2	11.5	247 33 30.0	4 1 29.9
12.0	149 15 16.1	2 32 53.1	12.0	201 0 11.0	5 10 35.5	12.0	254 39 4.0	3 36 7.1
12.5	155 55 38.1	3 4 6.6	12.5	208 6 7.2	5 14 29.5	12.5	261 41 28.6	3 7 37.9
13.0	162 39 24.8	3 33 3.4	13.0	215 12 45.1	5 13 34.9	13.0	268 40 37.8	2 36 32.6
13.5	169 26 35.2	+3 59 15.6	13.5	222 19 43.1	+5 7 51.7	13.5	275 36 29.3	+2 3 23.0
14.0	176 17 7.3	4 22 16.5	14.0	229 26 41.2	4 57 25.1	14.0	282 29 4.5	1 28 41.7
14.5	183 10 57.7	4 41 41.5	14.5	236 33 20.7	4 42 25.0	14.5	289 18 26.6	0 53 0.8
15.0	190 8 1.3	4 57 8.5	15.0	243 39 24.4	4 23 6.4	15.0	296 4 40.4	+0 16 52.4
15.5	197 8 10.8	5 8 18.2	15.5	250 44 36.3	3 59 48.7	15.5	302 47 50.8	-0 19 12.1
16.0	204 11 16.2	+5 14 54.9	16.0	257 48 41.4	+3 32 55.4	16.0	309 28 2.4	-0 54 42.7
16.5	211 17 4.7	5 16 47.1	16.5	264 51 24.9	3 2 53.4	16.5	316 5 19.0	1 29 10.9
17.0	218 25 20.0	5 13 47.8	17.0	271 52 32.4	2 30 12.7	17.0	322 39 43.6	2 2 10.2
17.5	225 35 42.1	5 5 55.1	17.5	278 51 49.5	1 55 25.8	17.5	329 11 17.6	2 33 15.9
18.0	232 47 47.1	4 53 12.6	18.0	285 49 1.7	1 19 6.8	18.0	335 40 1.3	3 2 6.0
18.5	240 1 7.2	+4 35 49.6	18.5	292 43 54.0	+0 41 50.9	18.5	342 5 54.3	-3 28 21.3
19.0	247 15 11.3	4 14 1.5	19.0	299 36 11.6	+0 4 13.6	19.0	348 28 55.4	3 51 45.2
19.5	254 29 25.3	3 48 9.4	19.5	306 25 39.6	-0 33 10.4	19.5	354 49 3.6	4 12 4.1
20.0	261 43 12.5	3 18 39.8	20.0	313 12 3.5	1 9 47.6	20.0	1 6 18.3	4 29 7.5
20.5	268 55 54.6	2 46 4.1	20.5	319 55 9.5	1 45 6.7	20.5	7 20 39.8	4 42 48.0
21.0	276 6 53.1	+2 10 57.7	21.0	326 34 45.0	-2 18 38.8	21.0	13 32 10.3	-4 53 0.7
21.5	283 15 30.1	1 33 58.7	21.5	333 10 39.7	2 49 58.6	21.5	19 40 53.9	4 59 43.4
22.0	290 21 9.4	0 55 47.0	22.0	339 42 45.0	3 18 44.0	22.0	25 46 57.2	5 2 56.4
22.5	297 23 17.5	+0 17 2.6	22.5	346 10 55.8	3 44 36.4	22.5	31 50 29.8	5 2 42.3
23.0	304 21 25.1	-0 21 35.2	23.0	352 35 9.8	4 7 21.4	23.0	37 51 44.5	4 59 5.3
23.5	311 15 7.1	-0 59 29.5	23.5	358 55 28.1	-4 26 47.8	23.5	43 50 57.3	-1 52 11.3
24.0	318 4 4.0	1 36 6.1	24.0	5 11 55.9	4 42 47.8	24.0	49 48 27.6	4 42 7.5
24.5	324 48 1.7	2 10 54.7	24.5	11 24 42.4	4 55 16.8	24.5	55 44 38.3	4 29 2.1
25.0	331 26 52.3	2 43 29.3	25.0	17 34 0.3	5 4 12.6	25.0	61 39 55.7	4 13 4.1
25.5	338 0 33.6	3 13 27.9	25.5	23 40 6.7	5 9 35.5	25.5	67 34 48.6	3 54 23.4
26.0	344 29 9.0	-3 40 32.7	26.0	29 43 21.8	-5 11 27.5	26.0	73 29 49.4	-3 33 10.4
26.5	350 52 47.4	4 4 30.0	26.5	35 44 9.7	5 9 52.3	26.5	79 25 32.7	3 9 36.1
27.0	357 11 42.9	4 25 9.9	27.0	41 42 57.1	5 4 54.8	27.0	85 22 35.3	2 43 52.5
27.5	3 26 14.1	4 42 25.2	27.5	47 40 13.8	4 56 40.6	27.5	91 21 35.5	2 16 11.9
28.0	9 36 43.3	4 56 11.7	28.0	53 36 31.9	4 45 16.5	28.0	97 23 13.3	1 46 47.9
28.5	15 43 36.4	5 6 27.5	28.5	59 32 25.7	4 30 49.6	28.5	103 28 8.8	1 15 55.2
29.0	21 47 22.1	-5 13 12.2	29.0	65 28 30.6	-4 13 27.8	29.0	109 37 1.9	-0 43 50.2
29.5	27 48 31.3	5 16 26.9	29.5	71 25 23.4	3 53 19.9	29.5	115 50 31.6	-0 10 50.8
30.0	33 47 36.6	5 16 14.0	30.0	77 23 41.6	3 30 35.0	30.0	122 9 15.0	+0 22 43.0
30.5	39 45 11.8	5 12 36.8	30.5	83 24 2.2	3 5 23.7	30.5	128 33 45.7	0 56 28.7
31.0	45 41 51.5	5 5 39.2	31.0	89 27 2.2	2 37 57.4	31.0	135 4 32.8	1 30 1.2
31.5	51 38 10.2	-4 55 26.0	31.5	95 33 17.5	-2 8 29.2	31.5	141 41 59.4	+2 2 53.2

## FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	OCTOBER.		Day of Month.	NOVEMBER.		Day of Month.	DECEMBER.	
	True Longitude.	Latitude.		True Longitude.	Latitude.		True Longitude.	Latitude.
1.0	135° 4' 32.8	+1° 30' 1.2	1.0	184° 33' 58.7	+4° 43' 42.6	1.0	222° 26' 40.8	+4° 49' 57.2
1.5	141 41 59.4	2 2 53.2	1.5	191 53 5.9	4 54 27.3	1.5	230 1 32.3	4 33 12.4
2.0	148 23 21.0	2 34 34.3	2.0	199 18 19.6	5 0 24.7	2.0	237 39 5.7	4 11 30.2
2.5	155 17 44.3	3 4 32.6	2.5	205 48 42.6	5 1 17.0	2.5	245 18 0.2	3 45 12.8
3.0	162 16 5.8	3 32 14.5	3.0	214 23 5.4	4 56 53.4	3.0	252 56 52.2	3 14 51.0
3.5	169 21 10.1	+3 57 5.6	3.5	222 0 9.8	+4 47 12.2	3.5	260 34 19.0	+2 41 3.5
4.0	176 32 30.2	4 18 32.3	4.0	229 38 31.4	4 32 21.1	4.0	268 9 2.4	2 4 34.1
4.5	183 49 27.0	4 36 3.0	4.5	237 16 44.0	4 12 36.7	4.5	275 39 51.4	1 26 10.3
5.0	191 11 10.2	4 49 10.2	5.0	244 53 23.9	3 48 24.6	5.0	283 5 44.8	0 46 40.5
5.5	198 36 39.6	4 57 31.4	5.5	252 27 13.5	3 20 17.9	5.5	290 25 53.7	+0 6 51.7
6.0	206 4 47.6	+5 0 51.1	6.0	259 57 4.5	+2 48 54.8	6.0	297 39 41.5	-0 32 31.6
6.5	213 34 22.7	4 59 1.4	6.5	267 22 0.3	2 14 57.0	6.5	304 46 43.7	1 10 49.4
7.0	221 4 11.7	4 52 2.8	7.0	274 41 17.0	1 39 7.8	7.0	311 46 47.9	1 47 26.6
7.5	228 33 3.9	4 40 4.2	7.5	281 54 24.1	1 2 9.8	7.5	318 39 52.4	2 21 53.9
8.0	235 59 53.5	4 23 21.9	8.0	289 1 3.5	+0 24 43.8	8.0	325 26 4.8	2 53 47.0
8.5	243 23 43.1	+4 2 19.6	8.5	296 1 8.9	-0 12 32.2	8.5	332 5 39.9	-3 22 46.6
9.0	250 43 44.7	3 37 25.9	9.0	302 54 43.6	0 49 3.9	9.0	338 38 58.5	3 48 38.3
9.5	257 59 21.0	3 9 13.7	9.5	309 41 58.9	1 24 21.0	9.5	345 6 26.5	4 11 11.2
10.0	265 10 5.8	2 38 17.9	10.0	316 23 12.7	1 57 57.3	10.0	351 28 32.3	4 30 17.8
10.5	272 15 43.1	2 5 14.8	10.5	322 58 47.4	2 29 30.0	10.5	357 45 46.5	4 45 53.4
11.0	279 16 6.4	+1 30 40.7	11.0	329 29 8.1	-2 58 40.0	11.0	3 58 40.7	-4 57 55.6
11.5	286 11 17.2	0 55 10.6	11.5	335 54 41.5	3 25 11.3	11.5	10 7 46.5	5 6 23.7
12.0	293 1 23.5	+0 19 18.1	12.0	342 15 55.0	3 48 50.8	12.0	16 13 35.0	5 11 18.5
12.5	299 46 38.1	-0.16 25.2	12.5	348 33 15.7	4 9 27.8	12.5	22 16 36.1	5 12 42.4
13.0	306 27 17.1	0 51 30.1	13.0	354 47 9.4	4 26 53.8	13.0	28 17 18.6	5 10 38.8
13.5	313 3 38.8	-1 25 29.5	13.5	0 58 0.3	-4 41 2.4	13.5	34 16 9.3	-5 5 12.1
14.0	319 36 2.1	1 57 59.1	14.0	7 6 10.8	4 51 49.1	14.0	40 13 33.1	4 56 28.0
14.5	326 4 45.7	2 28 36.7	14.5	13 12 0.9	4 59 11.2	14.5	46 9 52.7	4 44 33.5
15.0	332 30 7.3	2 57 2.6	15.0	19 15 48.8	5 3 7.6	15.0	52 5 29.2	4 29 36.4
15.5	338 52 23.2	3 22 59.5	15.5	25 17 50.4	5 3 39.0	15.5	58 0 41.8	4 11 45.9
16.0	345 11 47.7	-3 46 12.3	16.0	31 18 19.7	-5 0 47.5	16.0	63 55 47.9	-3 51 12.5
16.5	351 28 34.2	4 6 28.3	16.5	37 17 29.5	4 54 37.2	16.5	69 51 3.4	3 28 8.2
17.0	357 42 50.2	4 23 36.9	17.0	43 15 30.8	4 45 13.6	17.0	75 46 43.3	3 2 46.1
17.5	3 54 47.1	4 37 30.1	17.5	49 12 34.4	4 32 43.9	17.5	81 43 0.7	2 35 20.8
18.0	10 4 31.0	4 48 2.0	18.0	55 8 50.7	4 17 16.9	18.0	87 40 9.8	2 6 8.2
18.5	16 12 7.9	-4 55 9.2	18.5	61 4 30.3	-3 59 2.6	18.5	93 38 23.4	-1 35 25.5
19.0	22 17 43.3	4 58 50.5	19.0	66 59 44.3	3 38 12.8	19.0	99 37 54.7	1 3 31.1
19.5	28 21 22.8	4 59 6.6	19.5	72 54 44.9	3 15 0.0	19.5	105 38 57.4	-0 30 44.4
20.0	34 23 12.3	4 56 0.5	20.0	78 49 45.8	2 49 38.3	20.0	111 41 45.9	+0 2 34.3
20.5	40 23 19.0	4 49 37.0	20.5	84 45 2.7	2 22 22.8	20.5	117 46 35.3	0 36 3.9
21.0	46 21 51.9	-4 40 2.8	21.0	90 40 53.3	-1 53 29.2	21.0	123 53 42.2	+1 9 22.4
21.5	52 19 1.6	4 27 25.9	21.5	96 37 37.5	1 23 14.4	21.5	130 3 24.2	1 42 7.6
22.0	58 15 1.3	4 11 55.6	22.0	102 35 37.8	0 51 55.7	22.0	136 16 0.2	2 13 56.7
22.5	64 10 7.1	3 53 42.6	22.5	108 35 19.1	-0 19 51.1	22.5	142 31 50.4	2 44 26.6
23.0	70 4 37.9	3 32 58.6	23.0	114 37 9.0	+0 12 40.6	23.0	148 51 15.9	3 13 14.0
23.5	75 58 55.6	-3 9 55.9	23.5	120 41 37.2	+0 45 19.8	23.5	155 14 38.1	+3 39 55.5
24.0	81 53 25.4	2 44 47.6	24.0	126 49 15.5	1 17 46.2	24.0	161 42 18.9	4 4 7.9
24.5	87 48 35.5	2 17 47.7	24.5	133 0 36.8	1 49 38.7	24.5	168 14 39.4	4 25 28.1
25.0	93 44 57.1	1 49 10.4	25.0	139 16 15.8	2 20 35.2	25.0	174 51 59.4	4 43 33.5
25.5	99 43 4.0	1 19 10.9	25.5	145 36 46.5	2 50 12.7	25.5	181 34 36.2	4 58 2.1
26.0	105 43 32.5	-0 48 5.3	26.0	152 2 42.5	+3 18 7.0	26.0	188 22 43.8	+5 8 33.3
26.5	111 47 0.8	-0 16 10.5	26.5	158 34 35.3	3 43 52.9	26.5	195 16 31.7	5 14 48.3
27.0	117 54 8.3	+0 16 15.5	27.0	165 12 53.1	4 7 4.2	27.0	202 16 3.2	5 16 30.7
27.5	124 5 35.3	0 48 53.3	27.5	171 57 50.0	4 27 14.2	27.5	209 21 14.9	5 13 27.6
28.0	130 22 1.5	1 21 22.0	28.0	178 50 9.9	4 43 56.2	28.0	216 31 55.2	5 5 30.3
28.5	136 44 5.3	1 53 18.6	28.5	185 49 34.0	4 56 43.9	28.5	223 47 43.7	4 52 35.6
29.0	143 12 22.8	+2 24 18.6	29.0	192 56 9.4	+5 5 12.8	29.0	231 8 10.2	+4 34 46.4
29.5	149 47 25.6	2 53 55.2	29.5	200 9 42.7	5 9 1.1	29.5	238 32 35.4	4 12 13.1
30.0	156 29 39.7	3 21 39.7	30.0	207 29 47.5	5 7 51.3	30.0	246 0 11.0	3 45 13.5
30.5	163 19 23.1	3 47 2.0	30.5	214 55 44.4	5 1 31.5	30.5	253 30 0.8	3 14 13.4
31.0	170 16 44.8	4 9 30.7	31.0	222 26 40.8	4 49 57.2	31.0	261 1 2.9	2 39 45.8
31.5	177 21 41.8	+4 28 34.4	31.5	230 1 32.3	+4 33 12.4	31.5	268 32 11.0	+2 2 30.2



FOR GREENWICH MEAN NOON.						
Date.	THE MOON'S EQUATOR.				Mean Solar Days.	Motion of $\zeta$
	$i$ Inclination to Earth's Equator.	$\Delta$ Ascend'g Node on Earth's Equator to Ascending Node on Ecliptic.	$\Omega'$ Ascend'g Node on Earth's Equator.	$\zeta$ Mean Longitude of the Moon.		
Jan. 1	24° 27.1	313° 41.9	357° 18.6	131° 28.4	0.1	1° 19.06
11	24 26.5	313 11.5	357 17.2	263 14.2	0.2	2 38.12
21	24 25.9	312 41.0	357 15.9	35 0.1	0.3	3 57.18
31	24 25.3	312 10.4	357 14.5	166 45.9	0.4	5 16.23
Feb. 10	24 24.7	311 39.8	357 13.2	298 31.8	0.5	6 35.29
					0.6	7 54.35
20	24 24.0	311 8.3	357 11.9	70 17.6	0.7	9 13.41
March 1	24 23.4	310 37.7	357 10.6	202 3.5	0.8	10 32.47
11	24 22.8	310 7.1	357 9.3	333 49.3	0.9	11 51.53
21	24 22.2	309 36.5	357 8.0	105 35.2	1.0	13 10.58
31	24 21.6	309 5.9	357 6.7	237 21.0	2.0	26 21.17
					3.0	39 31.75
April 10	24 20.9	308 35.3	357 5.5	9 6.8	4.0	52 42.33
20	24 20.3	308 4.7	357 4.3	140 52.6	5.0	65 52.92
30	24 19.6	307 34.0	357 3.1	272 38.4	6.0	79 3.50
May 10	24 19.0	307 3.4	357 1.9	44 24.3	7.0	92 14.09
20	24 18.3	306 32.7	357 0.7	176 10.1	8.0	105 24.67
					9.0	118 35.25
30	24 17.7	306 2.0	356 59.5	307 56.0	10.0	131 45.84
June 9	24 17.0	305 31.3	356 58.3	79 41.8		
19	24 16.4	305 0.6	356 57.2	211 27.7	Hours.	0° 32.94
29	24 15.7	304 29.9	356 56.0	343 13.5	1	1 5.88
July 9	24 15.0	303 59.2	356 54.9	114 59.4	2	1 38.82
					3	2 11.76
19	24 14.3	303 28.4	356 53.8	246 45.2	4	2 44.70
29	24 13.6	302 57.6	356 52.7	18 31.0	5	3 17.65
Aug. 8	24 12.9	302 26.8	356 51.7	150 16.8	6	3 50.59
18	24 12.2	301 56.0	356 50.6	282 2.6	7	4 23.53
28	24 11.5	301 25.2	356 49.6	53 48.5	8	4 56.47
					9	5 29.41
Sept. 7	24 10.8	300 54.4	356 48.5	185 34.3	10	6 2.35
17	24 10.1	300 23.6	356 47.5	317 20.2	11	6 35.29
27	24 9.4	299 52.7	356 46.5	89 6.0	12	7 8.23
Oct. 7	24 8.7	299 21.9	356 45.5	220 51.9	13	7 41.17
17	24 8.0	298 51.0	356 44.5	352 37.7	14	8 14.11
					15	8 47.06
27	24 7.2	298 20.1	356 43.5	124 23.6	16	9 20.00
Nov. 6	24 6.5	297 49.2	356 42.5	256 9.4	17	9 52.94
16	24 5.8	297 18.2	356 41.6	27 55.2	18	10 25.88
26	24 5.1	296 47.3	356 40.7	159 41.0	19	10 58.82
Dec. 6	24 4.3	296 16.3	356 39.8	291 26.8	20	11 31.76
					21	12 4.70
16	24 3.5	295 45.4	356 38.9	63 12.7	22	12 37.64
26	24 2.7	295 14.4	356 38.0	194 58.5	23	
36	24 1.9	294 43.4	356 37.1	326 44.4		

TABLE FOR THE LIBRATION OF THE MOON.

Argument,  $(\Omega - \lambda)$  or  $(\Omega - \lambda - 180^\circ)$ .

$\Omega - \lambda$	$\Delta \lambda$	$\frac{1}{a}$	$B$		$\Omega - \lambda$	$\Delta \lambda$	$\frac{1}{a}$	$B$	
0	0.0	39	0 0.0	190	46	0.6	56	0 3.9	134
1	0.0	39	0 1.6	179	47	0.6	57	1 4.9	133
2	0.0	39	0 3.1	178	48	0.6	58	1 6.0	132
3	0.1	39	0 4.7	177	49	0.6	59	1 7.0	131
4	0.1	39	0 6.2	176	50	0.6	60	1 8.0	130
5	0.1	39	0 7.7	175	51	0.6	62	1 9.0	129
6	0.2	39	0 9.3	174	52	0.6	63	1 10.0	128
7	0.2	39	0 10.8	173	53	0.5	64	1 10.9	127
8	0.2	39	0 12.4	172	54	0.5	66	1 11.8	126
9	0.2	39	0 13.9	171	55	0.5	67	1 12.7	125
10	0.2	39	0 15.4	170	56	0.5	69	1 13.6	124
11	0.3	39	0 16.9	169	57	0.5	71	1 14.5	123
12	0.3	40	0 18.5	168	58	0.5	73	1 15.3	122
13	0.3	40	0 20.0	167	59	0.5	75	1 16.1	121
14	0.3	40	0 21.5	166	60	0.5	77	1 16.9	120
15	0.3	40	0 23.0	165	61	0.5	80	1 17.6	119
16	0.3	40	0 24.5	164	62	0.5	83	1 18.4	118
17	0.3	40	0 26.0	163	63	0.5	86	1 19.1	117
18	0.3	41	0 27.4	162	64	0.5	89	1 19.8	116
19	0.4	41	0 28.9	161	65	0.4	92	1 20.4	115
20	0.4	41	0 30.4	160	66	0.4	95	1 21.1	114
21	0.4	41	0 31.8	159	67	0.4	99	1 21.7	113
22	0.4	42	0 33.2	158	68	0.4	103	1 22.3	112
23	0.4	42	0 34.7	157	69	0.4	108	1 22.9	111
24	0.4	42	0 36.1	156	70	0.4	113	1 23.4	110
25	0.4	43	0 37.5	155	71	0.4	119	1 23.9	109
26	0.5	43	0 38.9	154	72	0.4	125	1 24.4	108
27	0.5	43	0 40.3	153	73	0.4	132	1 24.9	107
28	0.5	44	0 41.7	152	74	0.3	141	1 25.3	106
29	0.5	44	0 43.1	151	75	0.3	150	1 25.7	105
30	0.5	45	0 44.4	150	76	0.3	160	1 26.1	104
31	0.5	45	0 45.7	149	77	0.3	172	1 26.5	103
32	0.5	46	0 47.0	148	78	0.2	186	1 26.8	102
33	0.5	46	0 48.4	147	79	0.2	202	1 27.1	101
34	0.5	47	0 49.7	146	80	0.2	222	1 27.4	100
35	0.5	47	0 51.0	145	81	0.2	247	1 27.7	99
36	0.5	48	0 52.2	144	82	0.2	278	1 27.9	98
37	0.5	48	0 53.4	143	83	0.1	318	1 28.1	97
38	0.6	49	0 54.7	142	84	0.1	370	1 28.3	96
39	0.6	50	0 55.9	141	85	0.1	440	1 28.5	95
40	0.6	50	0 57.1	140	86	0.1	555	1 28.6	94
41	0.6	51	0 58.3	139	87	0.1	740	1 28.7	93
42	0.6	52	0 59.4	138	88	0.0	1110	1 28.7	92
43	0.6	53	1 0.6	137	89	0.0	2220	1 28.8	91
44	0.6	54	1 1.7	136	90	0.0	$\infty$	1 28.8	90
45	0.6	55	1 2.8	135					
	$\Delta \lambda$	$\frac{1}{a}$	$B$	$\Omega - \lambda$		$\Delta \lambda$	$\frac{1}{a}$	$B$	$\Omega - \lambda$

 $\Delta \lambda$  has the sign of  $\tan (\lambda - \Omega)$  $a$  has the sign of  $\cos (\Omega - \lambda)$  $B$  has the sign of  $\sin (\Omega - \lambda)$

## FOR GREENWICH MEAN NOON.

Date.	Apparent Obliquity of the Ecliptic. (HANSEN.)	Equation of Equinoxes		Precession of Equinoxes in Longitude.	The Sun's		Mean Longitude of Moon's Ascending Node.
		In Longitude.	In R. A.		Aberration.	Hor. Par.	
Jan. 1	23° 27' 7.04	— 12.79	— 0.781	0.00	— 20.80	9.00	131° 13.5
11	7.19	12.52	0.765	1.38	20.79	9.00	130 41.7
21	7.39	12.36	0.755	2.75	20.77	8.99	130 10.0
31	7.63	12.33	0.753	4.13	20.74	8.98	129 38.2
Feb. 10	7.88	12.44	0.760	5.50	20.71	8.96	129 6.4
20	23 27 8.11	— 12.71	— 0.776	6.88	— 20.67	8.94	128 31.7
March 1	8.30	13.10	0.799	8.26	20.63	8.92	128 2.9
11	8.45	13.58	0.828	9.63	20.57	8.90	127 31.1
21	8.53	14.10	0.860	11.01	20.51	8.87	126 59.3
31	8.54	14.61	0.892	12.38	20.45	8.85	126 27.6
April 10	23 27 8.50	— 15.06	— 0.920	13.76	— 20.39	8.82	125 55.8
20	8.41	15.41	0.941	15.14	20.34	8.80	125 24.0
30	8.30	15.63	0.954	16.51	20.29	8.78	124 52.3
May 10	8.17	15.72	0.959	17.89	20.24	8.76	124 20.5
20	8 07	15.67	0.956	19.26	20.19	8.74	123 48.7
30	23 27 8.00	— 15.49	— 0.946	20.64	— 20.16	8.72	123 16.9
June 9	7.96	15.22	0.930	22.02	20.13	8.71	122 45.2
19	7.97	14.90	0.910	23.39	20.11	8.71	122 13.4
29	8.06	14.58	0.890	24.77	20.11	8.70	121 41.6
July 9	8.20	14.29	0.872	26.14	20.10	8.70	121 9.8
19	23 27 8.38	— 14.08	— 0.859	27.52	— 20.12	8.71	120 38.1
29	8.60	13.98	0.853	28.90	20.14	8.72	120 6.3
Aug. 8	8.85	14.01	0.855	30.27	20.17	8.73	119 34.5
18	9.09	14.17	0.865	31.65	20.20	8.75	119 2.8
28	9.32	14.46	0.883	33.02	20.24	8.77	118 31.0
Sept. 7	23 27 9.50	— 14.85	— 0.907	34.40	— 20.29	8.79	117 59.2
17	9.61	15.31	0.935	35.78	20.35	8.81	117 27.4
27	9.67	15.80	0.965	37.15	20.41	8.84	116 55.7
Oct. 7	9.68	16.27	0.993	38.53	20.47	8.87	116 23.9
17	9.64	16.68	1.018	39.90	20.53	8.88	115 52.1
27	23 27 9.55	— 16.97	— 1.036	41.28	— 20.59	8.91	115 20.3
Nov. 6	9.43	17.12	1.045	42.66	20.64	8.93	114 48.6
16	9.31	17.10	1.044	44.03	20.69	8.95	114 16.8
26	9.22	16.94	1.034	45.41	20.73	8.97	113 45.0
Dec. 6	9.17	16.68	1.018	46.78	20.76	8.98	113 13.3
16	23 27 9.17	— 16.34	— 0.997	48.16	— 20.78	8.99	112 41.5
26	9.23	15.96	0.974	49.54	20.79	9.00	112 9.7
36	23 27 9.36	— 15.59	— 0.952	50.91	— 20.79	9.00	111 37.9
Mean Obliquity, 1888.0, 23° 27' 13".64 (HANSEN). Mean Obliquity, 1888.0, 23° 27' 13".33 (PETERS). Precession for 1888.5 . . . . . 50".2613 log 1.70123 Precession in a Solar Day . . . . . 0".1376 log 9.13863 Precession in a Sidereal Day . . . . . 0".1372 log 9.13744 Sun's Mean Equatorial Horizontal Parallax . 8".848 log 0.94685							Daily Motion of $\Omega$ — 3".177

*P A R T   I I*

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ASTRONOMICAL EPHEMERIS

FOR THE

MERIDIAN OF WASHINGTON

FORMULÆ FOR THE REDUCTION OF THE POSITIONS OF THE FIXED STARS, USING THE NOTATION OF BESSEL, AND THE CONSTANTS OF PETERS AND STRUVE.

NOTATION.

- $\tau$ , the time, reckoned in units of one year, from the beginning of the Besselian fictitious year, (1887, December 31<sup>d</sup>.196 = 1888, January 0<sup>d</sup>.196, Washington mean time),  
 $\alpha_0, \delta_0$ , the star's mean right ascension and declination at the beginning of the fictitious year,  
 $\alpha, \delta$ , the star's apparent right ascension and declination at the time  $\tau$ ,  
 $\mu, \mu'$ , the annual proper motion in right ascension and declination,  
 $\odot$ , the sun's true longitude,  
 $\Omega$ , the longitude of the moon's ascending node,  
 $\omega$ , the obliquity of the ecliptic,  
 $\Gamma$ , the longitude of the sun's perigee,  
 $\Gamma'$ , the longitude of the moon's perigee,  
 $\zeta$ , the moon's mean longitude.

BESSELIAN STAR-NUMBERS.

$$\begin{aligned} A &= \tau - 0.34248 \sin \Omega & - 0.00011 \sin (3 \odot - \Gamma) \\ &+ 0.00410 \sin 2 \Omega & - 0.00005 \sin 2 (\odot - \Omega) \\ &- 0.02521 \sin 2 \odot & + 0.00010 \sin 2 (\odot - \Gamma') \\ &+ 0.00293 \sin (\odot + 82^\circ 8') & + 0.00009 \sin (2 \Gamma' - \Omega) \\ &+ 0.00025 \sin (2 \odot - \Omega) & + 0.00005 \cos \Gamma' \\ &- 0.00405 \sin 2 \zeta & + 0.00004 \sin 2 \Gamma' \\ &+ 0.00135 \sin (\zeta - \Gamma') \\ B &= -9''.2239 \cos \Omega & - 0''.0027 \cos (3 \odot - \Gamma) \\ &+ 0.0895 \cos 2 \Omega & + 0.0067 \cos (2 \odot - \Omega) \\ &- 0.5506 \cos 2 \odot & + 0.0024 \cos (2 \Gamma' - \Omega) \\ &- 0.0092 \cos (\odot + 280^\circ 57') & - 0.0023 \sin \Gamma' \\ &- 0.0886 \cos 2 \zeta & + 0.0008 \cos 2 \Gamma' \\ C &= -20''.4451 \cos \omega \cos \odot \\ D &= -20.4451 \sin \odot \\ E &= -0.0461 \sin \Omega + 0''.0014 \sin 2 \Omega - 0''.0033 \sin 2 \odot \end{aligned}$$

BESSEL'S Star-Constants.

$$\begin{aligned} a &= 3''.07244 + 1''.33689 \sin \alpha_0 \tan \delta_0 = \text{precession in right ascension} \\ b &= \frac{1}{15} \cos \alpha_0 \tan \delta_0 \\ c &= \frac{1}{15} \cos \alpha_0 \sec \delta_0 \\ d &= \frac{1}{15} \sin \alpha_0 \sec \delta_0 \\ a' &= 20''.0533 \cos \alpha_0 = \text{precession in declination} \\ b' &= -\sin \alpha_0 \\ c' &= \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0 \\ d' &= \cos \alpha_0 \sin \delta_0 \end{aligned}$$

Reduction to Apparent Position.

$$\begin{aligned} \alpha &= \alpha_0 + \tau \mu + Aa + Bb + Cc + Dd + E & (\text{in time}) \\ \delta &= \delta_0 + \tau \mu' + Aa' + Bb' + Cc' + Dd' & (\text{in arc}) \end{aligned}$$

INDEPENDENT STAR-NUMBERS.

$$\begin{aligned} f &= 46''.0866 A + E \text{ (in arc)} = 3''.07244 A + \frac{1}{15} E \text{ (in time)} \\ g \sin G &= B & h \sin H &= C & i &= C \tan \omega \\ g \cos G &= 20''.0533 A & h \cos H &= D \end{aligned}$$

Reduction to Apparent Position.

$$\begin{aligned} \alpha &= \alpha_0 + f + \tau \mu + \frac{1}{15} g \sin (G + \alpha_0) \tan \delta + \frac{1}{15} h \sin (H + \alpha_0) \sec \delta & (\text{in time}) \\ \delta &= \delta_0 + \tau \mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta + i \cos \delta & (\text{in arc}) \end{aligned}$$

NOTES.—(1) The independent star-numbers are more convenient, when only one or two apparent positions of a star are required, or when BESSEL'S star-constants are not known with sufficient accuracy. Otherwise, the Besselian star-numbers are more convenient.

(2) In using the star-constants of the *British Association Catalogue*,  $a, b, c, d, a', b', c', d'$ , must be changed to  $c, d, a, b, -c', -d', -a', -b'$ , respectively.

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.
Jan. 0	-9.3960	+0.8211	-0.5247	+1.3036	Feb. 15	-9.0807	+0.7369	-1.1968	+1.0465
1	9.3897	0.8175	0.5653	1.3021	16	9.0790	0.7370	1.2017	1.0345
2	9.3848	0.8141	0.6023	1.3005	17	9.0748	0.7381	1.2063	1.0220
3	9.3808	0.8113	0.6363	1.2987	18	9.0677	0.7394	1.2108	1.0090
4	9.3775	0.8097	0.6676	1.2968	19	9.0574	0.7403	1.2151	0.9955
<sup>h</sup> (7.0) 5	-9.3741	+0.8092	-0.6967	+1.2948	<sup>h</sup> (10.0) 20	-9.0443	+0.7402	-1.2192	+0.9814
6	9.3700	0.8098	0.7239	1.2926	21	9.0296	0.7388	1.2232	0.9667
7	9.3646	0.8111	0.7493	1.2902	22	9.0144	0.7360	1.2270	0.9513
8	9.3576	0.8126	0.7731	1.2877	23	9.0006	0.7319	1.2307	0.9353
9	9.3491	0.8136	0.7956	1.2851	24	8.9894	0.7271	1.2341	0.9185
10	-9.3392	+0.8139	-0.8169	+1.2823	25	-8.9814	+0.7221	-1.2374	+0.9009
11	9.3287	0.8129	0.8371	1.2793	26	8.9766	0.7176	1.2405	0.8825
12	9.3182	0.8106	0.8562	1.2762	27	8.9742	0.7143	1.2435	0.8631
13	9.3086	0.8073	0.8744	1.2729	28	8.9729	0.7125	1.2464	0.8426
14	9.3006	0.8032	0.8917	1.2694	29	8.9709	0.7123	1.2491	0.8210
15	-9.2945	+0.7990	-0.9082	+1.2658	Mar. 1	-8.9665	+0.7133	-1.2516	+0.7982
16	9.2902	0.7951	0.9230	1.2620	2	8.9585	0.7151	1.2540	0.7740
17	9.2873	0.7921	0.9390	1.2581	3	8.9464	0.7169	1.2562	0.7481
18	9.2852	0.7903	0.9535	1.2540	4	8.9303	0.7182	1.2583	0.7206
19	9.2828	0.7897	0.9674	1.2497	5	8.9111	0.7182	1.2602	0.6910
<sup>h</sup> (8.0) 20	-9.2794	+0.7901	-0.9807	+1.2452	<sup>h</sup> (11.0) 6	-8.8906	+0.7168	-1.2620	+0.6592
21	9.2743	0.7912	0.9934	1.2405	7	8.8706	0.7140	1.2637	0.6246
22	9.2671	0.7922	1.0056	1.2357	8	8.8535	0.7101	1.2652	0.5871
23	9.2580	0.7927	1.0174	1.2306	9	8.8412	0.7055	1.2666	0.5457
24	9.2474	0.7921	1.0287	1.2254	10	8.8343	0.7010	1.2679	0.5000
25	-9.2360	+0.7903	-1.0396	+1.2200	11	-8.8326	+0.6974	-1.2690	+0.4488
26	9.2248	0.7871	1.0501	1.2144	12	8.8342	0.6952	1.2700	0.3905
27	9.2146	0.7830	1.0602	1.2085	13	8.8366	0.6946	1.2708	0.3231
28	9.2062	0.7782	1.0700	1.2024	14	8.8377	0.6956	1.2715	0.2432
29	9.1998	0.7735	1.0794	1.1961	15	8.8350	0.6977	1.2721	0.1452
30	-9.1952	+0.7694	-1.0885	+1.1896	16	-8.8271	+0.7004	-1.2726	+0.0183
Feb. 31	9.1919	0.7663	1.0973	1.1828	17	8.8136	0.7029	1.2729	9.8382
1	9.1889	0.7646	1.1057	1.1758	18	8.7944	0.7046	1.2731	+9.5250
2	9.1851	0.7643	1.1138	1.1685	19	8.7711	0.7050	1.2731	-8.2788
3	9.1797	0.7648	1.1217	1.1610	20	8.7458	0.7038	1.2731	9.5717
<sup>h</sup> (9.0) 4	-9.1719	+0.7658	-1.1293	+1.1532	<sup>h</sup> (12.0) 21	-8.7212	+0.7012	-1.2729	-9.8615
5	9.1617	0.7666	1.1366	1.1451	22	8.7000	0.6977	1.2725	0.0334
6	9.1492	0.7667	1.1436	1.1368	23	8.6817	0.6937	1.2721	0.1563
7	9.1354	0.7656	1.1504	1.1281	24	8.6754	0.6902	1.2715	0.2513
8	9.1212	0.7631	1.1570	1.1192	25	8.6715	0.6877	1.2707	0.3294
9	-9.1081	+0.7593	-1.1633	+1.1099	26	-8.6706	+0.6867	-1.2699	-0.3955
10	9.0971	0.7546	1.1694	1.1003	27	8.6687	0.6875	1.2689	0.4526
11	9.0891	0.7495	1.1753	1.0903	28	8.6626	0.6898	1.2678	0.5030
12	9.0842	0.7447	1.1810	1.0799	29	8.6500	0.6930	1.2665	0.5480
13	9.0819	0.7407	1.1864	1.0692	30	8.6284	0.6965	1.2652	0.5846
14	-9.0613	+0.7381	-1.1916	+1.0581	31	-8.5969	+0.6996	-1.2637	-0.6256
15	-9.0807	+0.7369	-1.1968	+1.0465	32	-8.5558	+0.7016	-1.2620	-0.6596

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.
Apr. 1	-8.5558	+0.7016	-1.2620	-0.6596	May 17	+8.8598	+0.7260	-1.0015	-1.2374
2	8.5076	0.7022	1.2602	0.6909	18	8.8713	0.7240	0.9897	1.2419
3	8.4548	0.7012	1.2583	0.7200	19	8.8801	0.7232	0.9775	1.2463
h 4	8.4036	0.6990	1.2563	0.7471	h 20	8.8876	0.7238	0.9649	1.2505
(13.0) 5	8.3606	0.6959	1.2541	0.7725	(16.0) 21	8.8963	0.7258	0.9518	1.2545
6	-8.3314	+0.6928	-1.2518	-0.7964	22	+8.9078	+0.7290	-0.9381	-1.2584
7	8.3170	0.6902	1.2493	0.8189	23	8.9234	0.7328	0.9238	1.2621
8	8.3153	0.6890	1.2467	0.8402	24	8.9426	0.7365	0.9089	1.2657
9	8.3195	0.6893	1.2439	0.8603	25	8.9645	0.7395	0.8934	1.2691
10	8.3204	0.6913	1.2411	0.8794	26	8.9876	0.7413	0.8772	1.2723
11	-8.3107	+0.6945	-1.2381	-0.8976	27	+9.0101	+0.7416	-0.8603	-1.2754
12	8.2835	0.6985	1.2349	0.9149	28	9.0304	0.7405	0.8425	1.2784
13	8.2338	0.7026	1.2315	0.9314	29	9.0474	0.7382	0.8238	1.2812
14	8.1529	0.7059	1.2280	0.9472	30	9.0607	0.7354	0.8042	1.2839
15	8.0310	0.7080	1.2244	0.9623	31	9.0702	0.7327	0.7836	1.2865
16	-7.8163	+0.7086	-1.2206	-0.9767	June 1	+9.0767	+0.7306	-0.7619	-1.2889
17	7.5366	0.7077	1.2166	0.9906	2	9.0815	0.7298	0.7388	1.2912
18	-6.5441	0.7056	1.2125	1.0039	3	9.0856	0.7304	0.7143	1.2934
19	+7.3181	0.7030	1.2082	1.0166	h 4	9.0907	0.7324	0.6882	1.2954
20	7.5752	0.7005	1.2038	1.0289	(17.0) 5	9.0978	0.7353	0.6604	1.2973
h (14.0) 21	+7.6822	+0.6989	-1.1992	-1.0407	6	+9.1076	+0.7385	-0.6306	-1.2991
22	7.7388	0.6985	1.1944	1.0521	7	9.1199	0.7415	0.5984	1.3007
23	7.7868	0.6998	1.1894	1.0631	8	9.1342	0.7436	0.5634	1.3022
24	7.8519	0.7026	1.1842	1.0736	9	9.1494	0.7443	0.5253	1.3036
25	7.9420	0.7065	1.1789	1.0838	10	9.1644	0.7436	0.4834	1.3048
26	+8.0500	+0.7109	-1.1734	-1.0936	11	+9.1779	+0.7415	-0.4369	-1.3059
27	8.1629	0.7149	1.1677	1.1031	12	9.1896	0.7384	0.3847	1.3069
28	8.2683	0.7181	1.1618	1.1123	13	9.1988	0.7350	0.3252	1.3078
29	8.3610	0.7199	1.1557	1.1211	14	9.2058	0.7318	0.2561	1.3086
30	8.4371	0.7202	1.1494	1.1296	15	9.2113	0.7295	0.1730	1.3092
May 1	+8.4969	+0.7191	-1.1428	-1.1379	16	+9.2159	+0.7285	-0.0726	-1.3097
2	8.5407	0.7171	1.1360	1.1458	17	9.2207	0.7289	9.9395	1.3101
3	8.5705	0.7147	1.1290	1.1535	18	9.2267	0.7306	9.7466	1.3104
4	8.5889	0.7126	1.1218	1.1609	h 19	9.2342	0.7331	-9.3909	1.3106
5	8.5993	0.7115	1.1143	1.1681	(18.0) 20	9.2438	0.7357	+8.8261	1.3106
h (15.0) 6	+8.6057	+0.7118	-1.1065	-1.1751	21	+9.2551	+0.7378	+9.5786	-1.3105
7	8.6118	0.7136	1.0985	1.1818	22	9.2675	0.7389	9.8395	1.3103
8	8.6222	0.7168	1.0902	1.1882	23	9.2799	0.7385	0.0013	1.3100
9	8.6392	0.7208	1.0816	1.1945	24	9.2918	0.7366	0.1186	1.3096
10	8.6639	0.7250	1.0728	1.2006	25	9.3022	0.7334	0.2108	1.3090
11	+8.6945	+0.7287	-1.0637	-1.2064	26	+9.3106	+0.7294	+0.2866	-1.3083
12	8.7288	0.7314	1.0542	1.2120	27	9.3170	0.7252	0.3512	1.3075
13	8.7631	0.7326	1.0444	1.2175	28	9.3215	0.7215	0.4073	1.3066
14	8.7948	0.7323	1.0342	1.2227	29	9.3246	0.7189	0.4569	1.3055
15	8.8220	0.7308	1.0237	1.2278	30	9.3272	0.7177	0.5013	1.3043
16	+8.8437	+0.7281	-1.0128	-1.2327	31	+9.3301	+0.7180	+0.5414	-1.3030
17	+8.8598	+0.7260	-1.0015	-1.2374	32	+9.3338	+0.7194	+0.5780	-1.3016

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.
July 1	+9.3301	+0.7180	+0.5414	-1.3030	Aug. 16	+9.5400	+0.6377	+1.1848	-1.0726
2	9.3338	0.7194	0.5780	1.3016	17	9.5454	0.6350	1.1899	1.0691
3	9.3389	0.7214	0.6117	1.3000	18	9.5503	0.6305	1.1948	1.0512
4	9.3457	0.7233	0.6429	1.2983	19	9.5544	0.6246	1.1995	1.0399
5	9.3538	0.7245	0.6718	1.2965	<sup>h</sup> (22.0) 20	9.5574	0.6179	1.2040	1.0282
<sup>h</sup> (19.0) 6	+9.3627	+0.7245	+0.6988	-1.2946	21	+9.5593	+0.6114	+1.2084	-1.0160
7	9.3718	0.7229	0.7241	1.2925	22	9.5601	0.6058	1.2127	1.0034
8	9.3803	0.7198	0.7479	1.2903	23	9.5604	0.6019	1.2168	0.9902
9	9.3877	0.7155	0.7704	1.2880	24	9.5605	0.6001	1.2207	0.9765
10	9.3937	0.7106	0.7917	1.2855	25	9.5608	0.6001	1.2244	0.9622
11	+9.3983	+0.7057	+0.8119	-1.2829	26	+9.5618	+0.6015	+1.2280	-0.9473
12	9.4017	0.7016	0.8310	1.2802	27	9.5637	0.6035	1.2315	0.9317
13	9.4044	0.6987	0.8492	1.2774	28	9.5666	0.6052	1.2348	0.9154
14	9.4070	0.6974	0.8665	1.2744	29	9.5702	0.6058	1.2379	0.8983
15	9.4101	0.6975	0.8831	1.2712	30	9.5743	0.6046	1.2409	0.8804
16	+9.4142	+0.6987	+0.8990	-1.2679	31	+9.5783	+0.6015	+1.2438	-0.8616
17	9.4195	0.7003	0.9142	1.2644	Sept. 1	9.5820	0.5966	1.2465	0.8418
18	9.4262	0.7016	0.9287	1.2608	2	9.5849	0.5904	1.2491	0.8209
19	9.4338	0.7019	0.9427	1.2571	3	9.5869	0.5838	1.2515	0.7988
20	9.4417	0.7009	0.9561	1.2532	<sup>h</sup> (23.0) 4	9.5881	0.5777	1.2538	0.7754
<sup>h</sup> (20.0) 21	+9.4495	+0.6981	+0.9690	-1.2491	<sup>h</sup> (23.0) 5	+9.5886	+0.5729	+1.2560	-0.7505
22	9.4564	0.6939	0.9814	1.2449	6	9.5888	0.5701	1.2581	0.7239
23	9.4621	0.6886	0.9934	1.2405	7	9.5891	0.5696	1.2600	0.6954
24	9.4665	0.6828	1.0049	1.2360	8	9.5899	0.5709	1.2618	0.6649
25	9.4694	0.6773	1.0160	1.2312	9	9.5915	0.5735	1.2634	0.6318
26	+9.4712	+0.6729	+1.0268	-1.2263	10	+9.5940	+0.5765	+1.2649	-0.5958
27	9.4724	0.6700	1.0371	1.2213	11	9.5974	0.5787	1.2663	0.5565
28	9.4736	0.6687	1.0471	1.2160	12	9.6013	0.5796	1.2676	0.5130
29	9.4752	0.6689	1.0567	1.2105	13	9.6055	0.5785	1.2687	0.4646
30	9.4778	0.6701	1.0661	1.2048	14	9.6095	0.5754	1.2696	0.4098
31	+9.4815	+0.6714	+1.0751	-1.1990	15	+9.6128	+0.5706	+1.2705	-0.3470
Aug. 1	9.4863	0.6723	1.0838	1.1930	16	9.6153	0.5647	1.2713	0.2733
2	9.4919	0.6719	1.0922	1.1868	17	9.6168	0.5587	1.2719	0.1850
3	9.4977	0.6699	1.1003	1.1803	18	9.6174	0.5536	1.2724	0.0730
4	9.5034	0.6661	1.1082	1.1736	19	9.6174	0.5502	1.2728	9.9212
<sup>h</sup> (2.0) 5	+9.5084	+0.6609	+1.1158	-1.1667	<sup>h</sup> (0.0) 20	+9.6171	+0.5491	+1.2730	-9.6857
6	9.5124	0.6548	1.1232	1.1595	21	9.6169	0.5503	1.2731	-9.1303
7	9.5154	0.6484	1.1303	1.1521	22	9.6172	0.5532	1.2731	+9.3304
8	9.5173	0.6426	1.1372	1.1444	23	9.6183	0.5572	1.2730	9.7513
9	9.5186	0.6382	1.1439	1.1365	24	9.6203	0.5611	1.2727	9.9610
10	+9.5196	+0.6356	+1.1504	-1.1283	25	+9.6231	+0.5641	+1.2723	+0.1018
11	9.5209	0.6347	1.1566	1.1198	26	9.6263	0.5653	1.2718	0.2079
12	9.5228	0.6353	1.1626	1.1110	27	9.6298	0.5645	1.2711	0.2925
13	9.5258	0.6367	1.1685	1.1019	28	9.6330	0.5617	1.2703	0.3636
14	9.5298	0.6381	1.1741	1.0925	29	9.6356	0.5573	1.2694	+0.4246
15	+9.5346	+0.6387	+1.1795	-1.0827	30	+9.6375	+0.5522	+1.2684	+0.4781
16	+9.5400	+0.6377	+1.1848	-1.0726	31	+9.6387	+0.5473	+1.2672	+0.5256



## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hour.)	Log A.	Log B.	Log C.	Log D.
Oct. 1	+9.6387	+0.5473	+1.2672	+0.5256	Nov. 16	+9.7287	+0.5930	+1.0280	+1.2258
2	9.6392	0.5437	1.2659	0.5683	17	9.7308	0.5986	1.0167	1.2309
3	9.6394	0.5421	1.2645	0.6070	18	9.7336	0.6037	1.0050	1.2359
h 4	9.6396	0.5428	1.2629	0.6425	h 19	9.7369	0.6076	0.9928	1.2408
(1.0) 5	9.6401	0.5458	1.2612	0.6752	(4.0) 20	9.7406	0.6096	0.9801	1.2454
6	+9.6413	+0.5503	+1.2593	+0.7055	21	+9.7442	+0.6095	+0.9669	+1.2498
7	9.6433	0.5554	1.2573	0.7337	22	9.7476	0.6077	0.9531	1.2541
8	9.6462	0.5601	1.2552	0.7601	23	9.7505	0.6047	0.9387	1.2582
9	9.6497	0.5636	1.2529	0.7849	24	9.7529	0.6011	0.9237	1.2621
10	9.6536	0.5651	1.2505	0.8082	25	9.7546	0.5981	0.9080	1.2659
11	+9.6574	+0.5645	+1.2479	+0.8302	26	+9.7560	+0.5963	+0.8916	+1.2695
12	9.6608	0.5621	1.2452	0.8510	27	9.7572	0.5964	0.8744	1.2729
13	9.6635	0.5583	1.2424	0.8707	28	9.7585	0.5984	0.8563	1.2761
14	9.6654	0.5541	1.2394	0.8895	29	9.7601	0.6021	0.8373	1.2792
15	9.6664	0.5505	1.2362	0.9075	30	9.7624	0.6068	0.8173	1.2822
16	+9.6668	+0.5484	+1.2329	+0.9247	Dec. 1	+9.7653	+0.6116	+0.7961	+1.2850
17	9.6669	0.5485	1.2294	0.9411	2	9.7688	0.6156	0.7737	1.2876
18	9.6670	0.5509	1.2258	0.9567	3	9.7727	0.6181	0.7500	1.2901
h 19	9.6675	0.5552	1.2220	0.9716	h 4	9.7767	0.6187	0.7247	1.2925
(2.0) 20	9.6687	0.5608	1.2180	0.9859	(5.0) 5	9.7806	0.6173	0.6977	1.2947
21	+9.6706	+0.5666	+1.2138	+0.9997	6	+9.7841	+0.6143	+0.6688	+1.2967
22	9.6732	0.5716	1.2095	1.0129	7	9.7870	0.6103	0.6376	1.2986
23	9.6764	0.5751	1.2050	1.0256	8	9.7893	0.6061	0.6039	1.3004
24	9.6799	0.5766	1.2003	1.0378	9	9.7909	0.6027	0.5672	1.3020
25	9.6833	0.5760	1.1954	1.0496	10	9.7922	0.6006	0.5269	1.3035
26	+9.6863	+0.5737	+1.1904	+1.0610	11	+9.7933	+0.6005	+0.4823	+1.3048
27	9.6887	0.5704	1.1852	1.0719	12	9.7945	0.6022	0.4324	1.3060
28	9.6905	0.5670	1.1797	1.0824	13	9.7960	0.6054	0.3760	1.3071
29	9.6916	0.5645	1.1740	1.0925	14	9.7980	0.6093	0.3109	1.3080
30	9.6924	0.5637	1.1682	1.1023	15	9.8006	0.6130	0.2341	1.3088
31	+9.6930	+0.5650	+1.1621	+1.1118	16	+9.8037	+0.6157	+0.1408	+1.3094
Nov. 1	9.6939	0.5684	1.1558	1.1209	17	9.8071	0.6166	0.0212	1.3099
2	9.6954	0.5735	1.1492	1.1297	18	9.8106	0.6156	9.8555	1.3103
h 3	9.6975	0.5794	1.1424	1.1383	h 19	9.8139	0.6126	9.5843	1.3105
(3.0) 4	9.7004	0.5852	1.1354	1.1465	(6.0) 20	9.8168	0.6082	+8.6990	1.3106
5	+9.7040	+0.5899	+1.1281	+1.1544	21	+9.8192	+0.6030	-9.4518	+1.3105
6	9.7080	0.5928	1.1206	1.1621	22	9.8211	0.5978	9.7903	1.3103
7	9.7120	0.5938	1.1127	1.1695	23	9.8226	0.5937	9.9777	1.3100
8	9.7158	0.5928	1.1046	1.1767	24	9.8238	0.5912	0.1082	1.3096
9	9.7190	0.5903	1.0962	1.1836	25	9.8250	0.5907	0.2084	1.3090
10	+9.7216	+0.5871	+1.0875	+1.1903	26	+9.8265	+0.5919	-0.2893	+1.3083
11	9.7235	0.5841	1.0785	1.1968	27	9.8284	0.5945	0.3577	1.3074
12	9.7247	0.5822	1.0691	1.2030	28	9.8308	0.5974	0.4165	1.3064
13	9.7255	0.5821	1.0594	1.2090	29	9.8338	0.5999	0.4683	1.3052
14	9.7262	0.5841	1.0493	1.2148	30	9.8371	0.6010	0.5144	1.3039
15	+9.7272	+0.5879	+1.0389	+1.2204	31	+9.8407	+0.6003	-0.5559	+1.3025
16	+9.7287	+0.5930	+1.0280	+1.2258	32	+9.8441	+0.5975	-0.5937	+1.3009

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .		
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
Jan.	0	0.0008	-11.51	-0.767	127 0	8 28.0	350 33	23 22.2	+0.9187	+1.3095	-1.45	-0.1622	
	1	0.0036	11.34	0.756	126 50	8 27.3	349 37	23 18.5	0.9142	1.3093	1.60	0.2028	
	2	0.0063	11.21	0.747	126 44	8 26.9	348 40	23 14.7	0.9102	1.3090	1.74	0.2397	
	3	0.0090	11.11	0.740	126 39	8 26.6	347 44	23 10.9	0.9070	1.3088	1.88	0.2736	
	4	0.0118	11.03	0.734	126 33	8 26.2	346 47	23 7.1	0.9049	1.3085	2.02	0.3049	
	<sup>b</sup> (7.0)	5	0.0145	-10.94	-0.729	126 22	8 25.5	345 50	23 3.3	+0.9033	+1.3082	-2.16	-0.3341
	6	0.0173	10.84	0.723	126 4	8 24.	344 54	22 59.6	0.9022	1.3078	2.30	0.3613	
	7	0.0200	10.71	0.714	125 39	8 22.6	343 57	22 55.8	0.9012	1.3075	2.44	0.3867	
	8	0.0227	10.53	0.702	125 8	8 20.5	343 0	22 52.0	0.9000	1.3071	2.57	0.4105	
	9	0.0255	10.33	0.689	124 32	8 18.1	342 3	22 48.2	0.8978	1.3067	2.71	0.4330	
	10	0.0282	-10.10	-0.674	123 55	8 15.7	341 6	22 44.4	+0.8948	+1.3063	-2.85	-0.4543	
	11	0.0310	9.86	0.657	123 20	8 13.3	340 8	22 40.5	0.8909	1.3059	2.98	0.4744	
	12	0.0337	9.62	0.642	122 50	8 11.3	339 11	22 36.7	0.8862	1.3055	3.12	0.4936	
	13	0.0364	9.41	0.628	122 28	8 9.9	338 14	22 32.9	0.8811	1.3050	3.25	0.5118	
	14	0.0392	9.24	0.616	122 14	8 8.9	337 16	22 29.1	0.8759	1.3046	3.38	0.5291	
<sup>b</sup> (8.0)	15	0.0419	- 9.11	-0.608	122 7	8 8.5	336 18	22 25.2	+0.8711	+1.3041	-3.51	-0.5456	
	16	0.0446	9.02	0.602	122 5	8 8.3	335 20	22 21.3	0.8671	1.3036	3.64	0.5614	
	17	0.0474	8.7	0.597	122 6	8 8.4	334 23	22 17.5	0.8641	1.3031	3.77	0.5765	
	18	0.0501	8.92	0.595	122 5	8 8.3	333 24	22 13.6	0.8622	1.3025	3.90	0.5909	
	19	0.0529	8.87	0.592	121 58	8 7.9	332 26	22 9.7	0.8611	1.3020	4.03	0.6048	
	20	0.0556	- 8.80	-0.587	121 44	8 6.9	331 28	22 5.9	+0.8605	+1.3015	-4.15	-0.6180	
	21	0.0583	8.70	0.580	121 23	8 5.5	330 29	22 1.9	0.8599	1.3009	4.27	0.6308	
	22	0.0611	8.56	0.571	120 54	8 3.6	329 31	21 58.1	0.8587	1.3003	4.40	0.6430	
	23	0.0638	8.38	0.559	120 21	8 1.4	328 32	21 54.1	0.8567	1.2997	4.52	0.6548	
	24	0.0665	8.18	0.545	119 46	7 59.1	327 33	21 50.2	0.8536	1.2991	4.64	0.6662	
	25	0.0693	- 7.97	-0.531	119 14	7 56.9	326 34	21 46.3	+0.8494	+1.2985	-4.75	-0.6771	
	26	0.0720	7.77	0.518	118 47	7 55.1	325 35	21 42.3	0.8444	1.2979	4.87	0.6876	
	27	0.0748	7.59	0.506	118 27	7 53.8	321 35	21 38.3	0.8388	1.2973	4.99	0.6978	
	28	0.0775	7.44	0.496	118 15	7 53.0	323 36	21 34.4	0.8333	1.2967	5.10	0.7074	
	29	0.0802	7.33	0.489	118 9	7 52.6	322 36	21 30.4	0.8292	1.2960	5.21	0.7168	
Feb.	30	0.0830	- 7.26	-0.484	118 8	7 52.5	321 36	21 26.4	+0.8240	+1.2954	-5.32	-0.7260	
	31	0.0857	7.20	0.480	118 7	7 52.5	320 36	21 22.4	0.8209	1.2947	5.43	0.7347	
	1	0.0884	7.15	0.477	118 3	7 52.2	319 36	21 18.4	0.8189	1.2941	5.54	0.7431	
	2	0.0912	7.09	0.473	117 51	7 51.4	318 36	21 14.4	0.8177	1.2934	5.64	0.7513	
	3	0.0939	7.00	0.467	117 32	7 50.1	317 35	21 10.3	0.8170	1.2927	5.74	0.7591	
	<sup>b</sup> (9.0)	4	0.0967	- 6.88	-0.459	117 4	7 48.3	316 35	21 6.3	+0.8162	+1.2921	-5.84	-0.7667
	5	0.0994	6.72	0.448	116 28	7 45.9	315 34	21 2.3	0.8148	1.2914	5.94	0.7740	
	6	0.1021	6.53	0.435	115 49	7 43.3	314 33	20 58.2	0.8124	1.2908	6.04	0.7810	
	7	0.1049	6.33	0.422	115 10	7 40.7	313 32	20 54.1	0.8089	1.2901	6.14	0.7879	
	8	0.1076	6.13	0.409	114 35	7 38.3	312 30	20 50.0	0.8043	1.2894	6.23	0.7945	
	9	0.1104	- 5.95	-0.396	114 7	7 36.5	311 29	20 45.9	+0.7990	+1.2888	-6.32	-0.8008	
	10	0.1131	5.80	0.386	113 49	7 35.3	310 27	20 41.8	0.7932	1.2881	6.41	0.8069	
	11	0.1158	5.69	0.380	113 40	7 34.7	309 26	20 37.7	0.7877	1.2875	6.50	0.8127	
	12	0.1186	5.63	0.375	113 40	7 34.7	308 24	20 33.6	0.7828	1.2868	6.58	0.8184	
	13	0.1213	5.60	0.373	113 45	7 35.0	307 21	20 29.4	0.7791	1.2862	6.67	0.8239	
14	0.1240	- 5.59	-0.373	113 51	7 35.4	306 19	20 25.3	+0.7768	+1.2855	-6.75	-0.8292		
15	0.1268	- 5.58	-0.372	113 52	7 35.5	305 17	20 21.1	+0.7758	+1.2849	-6.83	-0.8342		

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .		
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
Feb.	15	0.1268	-5.58	-0.372	113 52	7 35.5	305 17	20 21.1	+0.7758	+1.2849	-6.83	-0.8342	
	16	0.1295	5.56	0.370	113 47	7 35.1	304 14	20 16.9	0.7756	1.2843	6.90	0.8391	
	17	0.1323	5.51	0.367	113 32	7 34.1	303 11	20 12.7	0.7758	1.2837	6.98	0.8437	
	18	0.1350	5.42	0.361	113 8	7 32.5	302 9	20 8.6	0.7758	1.2831	7.05	0.8483	
	19	0.1377	5.29	0.353	112 36	7 30.4	301 5	20 4.3	0.7750	1.2825	7.12	0.8526	
	<sup>h</sup> (10.0)	20	0.1405	-5.14	-0.342	112 0	7 28.0	300 2	20 0.1	+0.7730	+1.2819	-7.19	-0.8567
	21	0.1432	4.97	0.331	111 23	7 25.5	298 59	19 55.9	0.7698	1.2814	7.26	0.8607	
	22	0.1459	4.80	0.320	110 51	7 23.4	297 56	19 51.7	0.7654	1.2808	7.32	0.8645	
	23	0.1487	4.65	0.310	110 25	7 21.7	296 52	19 47.5	0.7601	1.2803	7.38	0.8681	
	24	0.1514	4 53	0.302	110 9	7 20.6	295 48	19 43.2	0.7545	1.2797	7.44	0.8715	
	25	0.1542	-4.45	-0.296	110 1	7 20.1	294 45	19 39.0	+0.7492	+1.2792	-7.50	-0.8749	
	26	0.1569	4.41	0.293	110 0	7 20.0	293 41	19 34.7	0.7447	1.2788	7.55	0.8780	
	27	0.1596	4.38	0.291	110 3	7 20.2	292 36	19 30.4	0.7415	1.2783	7.60	0.8810	
	28	0.1624	4.37	0.291	110 4	7 20.3	291 32	19 26.1	0.7397	1.2779	7.65	0.8838	
	29	0 1651	4.35	0.290	109 59	7 19.9	290 28	19 21.9	0.7392	1.2774	7.70	0.8865	
Mar.	1	0.1678	-4.30	-0.287	109 46	7 19.1	289 24	19 17.6	+0.7397	+1.2770	-7.75	-0.8890	
	2	0.1706	4.22	0.281	109 21	7 17.4	288 19	19 13.3	0.7403	1.2766	7.79	0.8914	
	3	0.1733	4.11	0.274	108 47	7 15.1	287 15	19 9.0	0.7407	1.2762	7.83	0.8936	
	4	0.1761	3.96	0.264	108 6	7 12.4	286 10	19 4.7	0.7402	1.2758	7.87	0.8957	
	5	0.1788	3.79	0.253	107 22	7 9.5	285 6	19 0.4	0.7385	1.2755	7.90	0.8977	
	<sup>h</sup> (11.0)	6	0.1815	-3.62	-0.241	106 39	7 6.6	284 1	+0.7355	+1.2751	-7.93	-0.8995	
	7	0.1843	3.46	0.230	106 3	7 4.2	282 56	18 51.7	0.7313	1.2748	7.97	0.9012	
	8	0.1870	3.33	0.222	105 35	7 2.3	281 51	18 47.4	0.7263	1.2746	7.99	0.9027	
	9	0.1898	3.23	0.216	105 20	7 1.3	280 43	18 43.1	0.7212	1.2743	8.02	0.9040	
	10	0.1925	3.18	0.212	105 15	7 1.0	279 41	18 38.7	0.7166	1.2741	8.04	0.9053	
	11	0.1952	-3.17	-0.211	105 19	7 1.3	278 36	18 34.4	+0.7131	+1.2739	-8.06	-0.9064	
	12	0.1980	3.18	0.212	105 26	7 1.7	277 31	18 30.1	0.7112	1.2737	8.08	0.9074	
	13	0.2007	3.20	0.213	105 32	7 2.1	276 26	18 25.7	0.7108	1.2736	8.09	0.9082	
	14	0.2034	3.21	0.213	105 33	7 2.2	275 21	18 21.4	0.7118	1.2734	8.11	0.9090	
	15	0.2062	3.19	0.212	105 23	7 1.5	274 16	18 17.1	0.7136	1.2733	8.12	0.9096	
	16	0.2089	-3.13	-0.209	105 2	7 0.1	273 11	18 12.7	+0.7155	+1.2733	-8.13	-0.9100	
	17	0.2117	3 04	0.202	104 30	6 58 0	272 6	18 8.4	0.7170	1.2732	8.13	0.9103	
	18	0.2144	2.91	0.194	103 51	6 55.4	271 1	18 4.1	0.7174	1.2731	8.14	0.9105	
	19	0.2171	2.76	0.184	103 9	6 52.6	269 56	17 59.7	0.7165	1.2731	8.14	0.9106	
	20	0.2199	2.61	0.173	102 28	6 49.8	268 52	17 55.5	0.7141	1.2731	8.14	0.9105	
	<sup>h</sup> (12.0)	21	0.2226	-2.46	-0.164	101 52	6 47.5	267 47	17 51.1	+0.7106	+1.2732	-8.13	-0.9103
	22	0.2253	2.35	0.156	101 24	6 45.6	266 42	17 46.8	0.7063	1.2732	8.13	0.9089	
	23	0.2281	2.27	0.151	101 7	6 44.5	265 37	17 42.5	0.7020	1.2733	8.12	0.9095	
	24	0.2308	2.22	0.148	100 58	6 43.9	264 33	17 38.2	0.6982	1.2734	8.11	0.9089	
	25	0.2336	2.20	0.146	100 56	6 43.7	263 28	17 33.9	0.6957	1.2736	8.10	0.9082	
	26	0.2363	-2.20	-0.146	100 56	6 43.7	262 23	17 29.5	+0.6947	+1.2737	-8.08	-0.9074	
	27	0.2390	2.19	0.146	100 52	6 43.5	261 19	17 25.3	0.6954	1.2739	8.06	0.9064	
	28	0.2418	2.16	0.144	100 40	6 42.7	260 15	17 21.0	0.6973	1.2741	8.04	0.9053	
	29	0.2445	2.10	0.140	100 18	6 41.2	259 11	17 16.7	0.7000	1.2744	8.02	0.9040	
	30	0.2472	2.00	0.133	99 44	6 38.9	258 6	17 12.4	0.7028	1.2746	7.99	0.9026	
31	0.2500	-1.86	-0.124	99 0	6 36.0	257 2	17 8.1	+0.7050	+1.2749	-7.96	-0.9011		
32	0.2527	-1.70	-0.113	98 9	6 32.6	255 59	17 3.9	+0.7061	+1.2752	-7.93	-0.8994		

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .	
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.					
Apr.	1	0.2527	-1.70	-0.113	98 9	6 32.6	255 59	17 3.9	+0.7061	+1.2752	-7.93	-0.8994
	2	0.2555	1.52	0.101	97 18	6 29.2	254 55	16 59.7	0.7057	1.2755	7.90	0.8977
	3	0.2582	1.35	0.090	96 29	6 25.9	253 51	16 55.4	0.7040	1.2758	7.87	0.8957
	4	0.2609	1.21	0.080	95 48	6 23.2	252 48	16 51.2	0.7012	1.2762	7.83	0.8937
	<sup>b</sup> (13.0) 5	0.2637	1.10	0.073	95 18	6 21.2	251 44	16 46.9	0.6978	1.2765	7.79	0.8915
	6	0.2664	-1.03	-0.068	94 59	6 19.9	250 41	16 42.7	+0.6944	+1.2769	-7.75	-0.8892
	7	0.2692	1.00	0.066	94 51	6 19.4	249 38	16 38.5	0.6918	1.2773	7.70	0.8867
	8	0.2719	0.99	0.066	94 51	6 19.4	248 35	16 34.3	0.6905	1.2778	7.66	0.8842
	9	0.2746	1.00	0.066	94 54	6 19.6	247 33	16 30.2	0.6909	1.2782	7.61	0.8814
	10	0.2774	1.01	0.067	94 53	6 19.5	246 30	16 26.0	0.6929	1.2787	7.56	0.8785
	11	0.2801	-0.98	-0.066	94 44	6 18.9	245 28	16 21.9	+0.6960	+1.2792	-7.51	-0.8755
	12	0.2828	0.93	0.062	94 25	6 17.7	244 25	16 17.7	0.6998	1.2796	7.45	0.8723
	13	0.2856	0.83	0.055	93 54	6 15.6	243 23	16 13.5	0.7036	1.2801	7.40	0.8689
	14	0.2883	0.70	0.046	93 13	6 12.9	242 21	16 9.4	0.7066	1.2807	7.34	0.8655
	15	0.2911	0.54	0.036	92 25	6 9.7	241 20	16 5.3	0.7084	1.2812	7.27	0.8618
	16	0.2938	-0.37	-0.024	91 35	6 6.3	240 18	16 1.2	+0.7088	+1.2817	-7.21	-0.8580
	17	0.2965	0.20	0.013	90 47	6 3.1	239 17	15 57.1	0.7077	1.2823	7.15	0.8541
	18	0.2993	-0.06	-0.004	90 5	6 0.3	238 16	15 53.1	0.7056	1.2829	7.08	0.8499
	19	0.3020	+0.06	+0.004	89 32	5 58.1	237 15	15 49.0	0.7030	1.2834	7.01	0.8456
	20	0.3047	0.13	0.009	89 8	5 56.6	236 14	15 44.9	0.7006	1.2840	6.94	0.8412
<sup>b</sup> (14.0) 21	0.3075	+0.18	+0.012	88 54	5 55.6	235 14	15 40.9	+0.6989	+1.2846	-6.87	-0.8367	
22	0.3102	0.21	0.014	88 44	5 54.9	234 13	15 36.9	0.6987	1.2852	6.79	0.8319	
23	0.3130	0.24	0.016	88 36	5 54.4	233 13	15 32.9	0.7000	1.2858	6.71	0.8269	
24	0.3157	0.29	0.019	88 23	5 53.5	232 13	15 28.9	0.7028	1.2865	6.63	0.8217	
25	0.3184	0.36	0.024	88 2	5 52.1	231 14	15 24.9	0.7068	1.2871	6.55	0.8164	
26	0.3212	+0.48	+0.031	87 30	5 50.0	230 14	15 20.9	+0.7113	+1.2877	-6.47	-0.8109	
27	0.3239	0.63	0.042	86 47	5 47.1	229 15	15 17.0	0.7156	1.2883	6.38	0.8051	
28	0.3266	0.81	0.054	85 56	5 43.7	228 16	15 13.1	0.7192	1.2889	6.30	0.7992	
29	0.3294	1.02	0.068	84 59	5 39.9	227 17	15 9.1	0.7216	1.2896	6.21	0.7931	
30	0.3321	1.22	0.081	84 2	5 36.1	226 18	15 5.2	0.7226	1.2902	6.12	0.7867	
May	1	0.3349	+1.41	+0.093	83 9	5 32.6	225 19	15 1.3	+0.7223	+1.2908	-6.03	-0.7802
	2	0.3376	1.56	0.104	82 23	5 29.5	224 21	14 57.4	0.7209	1.2915	5.94	0.7734
	3	0.3403	1.67	0.112	81 48	5 27.2	223 23	14 53.5	0.7191	1.2921	5.84	0.7665
	4	0.3431	1.75	0.117	81 25	5 25.7	222 25	14 49.7	0.7175	1.2927	5.74	0.7592
	5	0.3458	1.79	0.119	81 12	5 24.8	221 27	14 45.8	0.7166	1.2934	5.65	0.7517
	<sup>b</sup> (15.0) 6	0.3486	+1.82	+0.121	81 4	5 24.3	220 30	14 42.0	+0.7171	+1.2940	-5.55	-0.7440
	7	0.3513	1.84	0.123	80 59	5 23.9	219 33	14 38.2	0.7190	1.2946	5.45	0.7360
	8	0.3540	1.89	0.126	80 50	5 23.3	218 35	14 34.3	0.7224	1.2952	5.34	0.7277
	9	0.3568	1.97	0.131	80 34	5 22.3	217 38	14 30.5	0.7267	1.2959	5.24	0.7191
	10	0.3595	2.08	0.139	80 7	5 20.5	216 41	14 26.7	0.7315	1.2965	5.13	0.7102
	11	0.3622	+2.24	+0.149	79 30	5 18.0	215 45	14 23.0	+0.7361	+1.2971	-5.03	-0.7011
	12	0.3650	2.43	0.162	78 44	5 14.9	214 49	14 19.3	0.7398	1.2977	4.92	0.6917
	13	0.3677	2.63	0.175	77 52	5 11.5	213 52	14 15.5	0.7424	1.2982	4.81	0.6818
	14	0.3705	2.83	0.189	76 58	5 7.9	212 56	14 11.7	0.7436	1.2988	4.70	0.6717
	15	0.3732	3.02	0.201	76 6	5 4.4	212 0	14 8.0	0.7437	1.2994	4.58	0.6611
16	0.3759	+3.17	+0.211	75 21	5 1.4	211 5	14 4.3	+0.7428	+1.3000	-4.47	-0.6502	
17	0.3787	+3.30	+0.220	74 44	4 58.9	210 9	14 0.6	+0.7416	+1.3005	-4.35	-0.6389	

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)		$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
			In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
May	17	0.3787	+3.30	+0.220	74 44	4 58.9	210 9	14 0.6	+0.7416	+1.3005	-4.35	-0.6389
	18	0.3814	3.39	0.226	74 17	4 57.1	209 14	13 56.9	0.7406	1.3010	4.21	0.6271
	19	0.3841	3.46	0.231	73 57	4 55.8	208 19	13 53.2	0.7405	1.3016	4.12	0.6149
	20	0.3869	3.52	0.231	73 42	4 54.8	207 24	13 49.5	0.7416	1.3021	4.00	0.6024
	<sup>h</sup> (16.0) 21	0.3896	3.59	0.239	73 28	4 53.9	206 29	13 45.9	0.7442	1.3026	3.88	0.5892
	22	0.3924	+3.69	+0.246	73 10	4 52.7	205 34	13 42.3	+0.7480	+1.3031	-3.76	-0.5755
	23	0.3951	3.82	0.255	72 43	4 50.9	204 39	13 38.6	0.7528	1.3036	3.64	0.5612
	24	0.3978	4.00	0.267	72 8	4 48.5	203 45	13 35.0	0.7579	1.3041	3.52	0.5461
	25	0.4006	4.21	0.280	71 24	4 45.6	202 50	13 31.3	0.7628	1.3045	3.40	0.5309
	26	0.4033	4.44	0.295	70 32	4 42.1	201 56	13 27.7	0.7668	1.3050	3.27	0.5147
	27	0.4060	+4.68	+0.311	69 35	4 38.3	201 2	13 24.1	+0.7697	+1.3054	-3.15	-0.4978
	28	0.4088	4.90	0.326	68 39	4 34.6	200 8	13 20.5	0.7714	1.3058	3.02	0.4800
	29	0.4115	5.10	0.340	67 46	4 31.1	199 14	13 16.9	0.7719	1.3062	2.89	0.4613
	30	0.4143	5.26	0.351	67 1	4 28.1	198 20	13 13.3	0.7714	1.3066	2.77	0.4417
	31	0.4170	5.38	0.359	66 26	4 25.8	197 27	13 9.8	0.7705	1.3069	2.64	0.4211
June	1	0.4197	+5.46	+0.364	66 1	4 24.1	196 33	13 6.2	+0.7699	+1.3073	-2.51	-0.3993
	2	0.4225	5.52	0.368	65 44	4 23.0	195 40	13 2.7	0.7699	1.3076	2.38	0.3762
	3	0.4252	5.57	0.371	65 34	4 22.3	194 46	12 59.1	0.7711	1.3080	2.25	0.3518
	4	0.4279	5.64	0.376	65 25	4 21.7	193 53	12 55.5	0.7736	1.3083	2.12	0.3256
	<sup>h</sup> (17.0) 5	0.4207	5.73	0.382	65 12	4 20.8	193 0	12 52.0	0.7772	1.3085	1.99	0.2979
	6	0.4334	+5.86	+0.391	64 52	4 19.5	192 7	12 48.5	+0.7817	+1.3088	-1.85	-0.2681
	7	0.4362	6.03	0.402	64 24	4 17.6	191 14	12 44.9	0.7864	1.3090	1.72	0.2358
	8	0.4389	6.24	0.416	63 46	4 15.1	190 21	12 41.4	0.7908	1.3093	1.59	0.2008
	9	0.4416	6.46	0.431	63 0	4 12.0	189 28	12 37.9	0.7945	1.3095	1.46	0.1628
	10	0.4444	6.69	0.446	62 9	4 8.6	188 35	12 34.3	0.7971	1.3097	1.32	0.1209
	11	0.4471	+6.90	+0.460	61 17	4 5.1	187 42	12 30.8	+0.7985	+1.3099	-1.19	-0.0744
	12	0.4499	7.09	0.473	60 28	4 1.8	186 50	12 27.3	0.7989	1.3100	1.05	0.0222
	13	0.4526	7.24	0.483	59 44	3 58.9	185 57	12 23.8	0.7986	1.3102	0.92	0.0628
	14	0.4553	7.36	0.491	59 9	3 56.6	185 4	12 20.3	0.7980	1.3103	0.78	0.0938
	15	0.4581	7.46	0.497	58 42	3 54.8	184 12	12 16.8	0.7978	1.3104	0.65	0.1116
	16	0.4608	+7.54	+0.503	58 22	3 53.5	183 19	12 13.3	+0.7984	+1.3105	-0.51	-0.0710
	17	0.4635	7.62	0.508	58 6	3 52.4	182 26	12 9.8	0.8000	1.3105	0.38	0.0575
	18	0.4663	7.73	0.515	57 51	3 51.4	181 34	12 6.3	0.8029	1.3106	0.24	0.0383
	19	0.4690	7.86	0.524	57 33	3 50.2	180 41	12 2.8	0.8069	1.3106	-0.11	-0.0294
	<sup>h</sup> (18.0) 20	0.4718	8.04	0.536	57 8	3 48.5	179 49	11 59.3	0.8115	1.3106	+0.02	+0.1462
	21	0.4745	+8.25	+0.550	56 35	3 46.3	178 56	11 55.8	+0.8163	+1.3106	+0.16	+0.2148
	22	0.4772	8.49	0.566	55 54	3 43.6	178 4	11 52.3	0.8209	1.3106	0.30	0.2471
	23	0.4800	8.74	0.583	55 6	3 40.4	177 11	11 48.8	0.8246	1.3105	0.44	0.2855
	24	0.4827	8.98	0.599	54 15	3 37.0	176 19	11 45.3	0.8273	1.3104	0.57	0.3259
	25	0.4854	9.20	0.613	53 24	3 33.6	175 26	11 41.8	0.8289	1.3103	0.71	0.3682
	26	0.4882	+9.38	+0.626	52 36	3 30.4	174 34	11 38.3	+0.8294	+1.3102	+0.84	+0.4243
	27	0.4909	9.52	0.635	51 56	3 27.7	173 41	11 34.8	0.8291	1.3101	0.98	0.4890
	28	0.4937	9.62	0.642	51 24	3 25.6	172 49	11 31.3	0.8286	1.3100	1.11	0.0449
	29	0.4964	9.69	0.646	51 2	3 24.1	171 56	11 27.7	0.8282	1.3098	1.24	0.0944
	30	0.4991	9.75	0.650	50 47	3 23.1	171 3	11 24.2	0.8285	1.3096	1.38	0.1388
	31	0.5019	+9.82	+0.654	50 37	3 22.5	170 11	11 20.7	+0.8298	+1.3094	+1.51	+0.1728
	32	0.5046	+9.90	+0.660	50 28	3 21.9	169 18	11 17.2	+0.8322	+1.3092	+1.64	+0.2155

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
July	1	0.5019	+ 9.82	+0.654	50 37	3 22.5	170 11	+0.8298	+1.3094	+1.51	+0.1788
	2	0.5046	9.90	0.660	50 28	3 21.9	169 18	0.8322	1.3092	1.64	0.2155
	3	0.5073	10.02	0.669	50 16	3 21.1	168 25	0.8355	1.3089	1.78	0.2492
	4	0.5101	10.18	0.680	49 57	3 19.8	167 32	0.8394	1.3087	1.91	0.2803
	5	0.5128	10.37	0.693	49 30	3 18.0	166 39	0.8435	1.3084	2.04	0.3093
	(19.0) 6	0.5156	+10.59	+0.707	48 55	3 15.7	165 46	+0.8472	+1.3081	+2.17	+0.3363
	7	0.5183	10.81	0.720	48 13	3 12.9	164 53	0.8503	1.3078	2.30	0.3616
	8	0.5210	11.03	0.734	47 28	3 9.9	164 0	0.8525	1.3075	2.43	0.3854
	9	0.5238	11.22	0.747	46 41	3 6.7	163 6	0.8536	1.3072	2.56	0.4079
	10	0.5265	11.37	0.758	45 58	3 3.9	162 13	0.8539	1.3068	2.69	0.4292
	11	0.5293	+11.49	+0.767	45 21	3 1.4	161 20	+0.8536	+1.3064	+2.81	+0.4493
	12	0.5320	11.58	0.773	44 51	2 59.4	160 26	0.8532	1.3061	2.94	0.4685
	13	0.5347	11.66	0.776	44 29	2 57.9	159 32	0.8532	1.3057	3.07	0.4866
	14	0.5375	11.73	0.781	44 13	2 56.9	158 39	0.8538	1.3052	3.19	0.5040
	15	0.5402	11.81	0.787	44 2	2 56.1	157 45	0.8555	1.3048	3.32	0.5206
	16	0.5429	+11.92	+0.796	43 50	2 55.3	156 51	+0.8582	+1.3044	+3.44	+0.5364
	17	0.5457	12.07	0.806	43 35	2 54.3	155 57	0.8618	1.3039	3.56	0.5516
	18	0.5484	12.26	0.818	43 14	2 52.9	155 3	0.8659	1.3034	3.68	0.5661
	19	0.5512	12.48	0.832	42 46	2 51.1	154 8	0.8701	1.3030	3.80	0.5802
	20	0.5539	12.71	0.847	42 10	2 48.7	153 13	0.8740	1.3025	3.92	0.5936
(20.0)	21	0.5566	+12.94	+0.862	41 29	2 45.9	152 19	+0.8771	+1.3019	+4.04	+0.6065
	22	0.5594	13.14	0.876	40 45	2 43.0	151 24	0.8792	1.3014	4.16	0.6189
	23	0.5621	13.32	0.887	40 2	2 40.1	150 29	0.8802	1.3009	4.27	0.6308
	24	0.5648	13.45	0.896	39 22	2 37.5	149 34	0.8804	1.3004	4.39	0.6424
	25	0.5676	13.54	0.903	38 50	2 35.3	148 39	0.8800	1.2998	4.50	0.6535
	26	0.5703	+13.60	+0.907	38 26	2 33.7	147 44	+0.8794	+1.2992	+4.62	+0.6642
	27	0.5731	13.64	0.909	38 10	2 32.7	146 48	0.8790	1.2987	4.73	0.6746
	28	0.5758	13.68	0.910	38 1	2 32.1	145 52	0.8793	1.2981	4.84	0.6845
	29	0.5785	13.73	0.914	37 55	2 31.7	144 56	0.8804	1.2975	4.95	0.6942
	30	0.5813	13.81	0.920	37 50	2 31.3	144 0	0.8824	1.2969	5.05	0.7035
Aug.	31	0.5840	+13.93	+0.920	37 41	2 30.7	143 4	+0.8853	+1.2963	+5.16	+0.7125
	1	0.5867	14.08	0.940	37 25	2 29.7	142 8	0.8886	1.2957	5.26	0.7212
	2	0.5895	14.27	0.952	37 3	2 28.2	141 11	0.8920	1.2951	5.37	0.7297
	3	0.5922	14.46	0.965	36 33	2 26.2	140 15	0.8950	1.2945	5.47	0.7378
	4	0.5950	14.65	0.977	35 57	2 23.8	139 18	0.8974	1.2939	5.57	0.7457
	(21.0) 5	0.5977	+14.82	+0.988	35 19	2 21.3	138 21	+0.8990	+1.2932	+5.67	+0.7533
	6	0.6004	14.96	0.997	34 41	2 18.7	137 24	0.8998	1.2926	5.76	0.7606
	7	0.6032	15.06	1.004	34 7	2 16.5	136 26	0.8998	1.2920	5.86	0.7678
	8	0.6059	15.13	1.009	33 39	2 14.6	135 29	0.9993	1.2914	5.95	0.7746
	9	0.6087	15.17	1.012	33 18	2 13.2	134 31	0.8987	1.2907	6.04	0.7813
(21.0)	10	0.6114	+15.21	+1.014	33 4	2 12.3	133 33	+0.8986	+1.2901	+6.13	+0.7878
	11	0.6141	15.25	1.017	32 57	2 11.8	132 34	0.8992	1.2895	6.22	0.7940
	12	0.6169	15.32	1.022	32 52	2 11.5	131 36	0.9008	1.2888	6.31	0.8000
	13	0.6196	15.43	1.029	32 46	2 11.1	130 37	0.9033	1.2882	6.40	0.8059
	14	0.6223	15.57	1.038	32 37	2 10.5	129 39	0.9065	1.2876	6.48	0.8116
	15	0.6251	+15.75	+1.050	32 22	2 9.5	128 40	+0.9101	+1.2870	+6.56	+0.8170
	16	0.6278	+15.94	+1.063	31 59	2 7.9	127 41	+0.9137	+1.2864	+6.64	+0.8223

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .		
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
Aug.	16	0.6278	+15.94	+1.063	31 59	2 7.9	127 41	8 30.7	+0.9137	+1.2864	+6.64	+0.8223	
	17	0.6306	16.14	1.076	31 31	2 6.1	126 41	8 26.7	0.9168	1.2858	6.72	0.8273	
	18	0.6333	16.33	1.088	30 57	2 3.8	125 42	8 22.8	0.9192	1.2852	6.80	0.8322	
	19	0.6360	16.48	1.099	30 23	2 1.5	124 42	8 18.8	0.9207	1.2846	6.87	0.8369	
	20	0.6388	16.60	1.106	29 49	1 59.3	123 42	8 14.8	0.9213	1.2840	6.94	0.8415	
	<sup>h</sup> (22.0)	21	0.6415	+16.67	+1.111	29 21	1 57.4	122 42	8 10.8	+0.9211	+1.2834	+7.01	+0.8459
	22	0.6442	16.70	1.113	28 50	1 55.9	121 42	8 6.8	0.9204	1.2828	7.08	0.8501	
	23	0.6470	16.71	1.114	28 45	1 55.0	120 41	8 2.7	0.9197	1.2823	7.15	0.8542	
	24	0.6497	16.71	1.114	28 39	1 54.6	119 41	7 58.7	0.9194	1.2817	7.21	0.8581	
	25	0.6525	16.72	1.115	28 38	1 54.5	118 40	7 54.7	0.9196	1.2812	7.28	0.8618	
	26	0.6552	+16.76	+1.118	28 39	1 54.6	117 39	7 50.6	+0.9207	+1.2807	+7.34	+0.8654	
	27	0.6579	16.84	1.123	28 39	1 54.6	116 38	7 46.5	0.9226	1.2801	7.40	0.8689	
	28	0.6607	16.95	1.130	28 36	1 54.4	115 37	7 42.5	0.9252	1.2796	7.45	0.8722	
	29	0.6634	17.09	1.140	28 25	1 53.7	114 35	7 38.4	0.9282	1.2792	7.51	0.8754	
	30	0.6661	17.25	1.150	28 8	1 52.5	113 34	7 34.3	0.9311	1.2787	7.56	0.8784	
	31	0.6689	+17.42	+1.161	27 45	1 51.0	112 32	7 30.1	+0.9336	+1.2782	+7.61	+0.8812	
	Sept.	1	0.6716	17.56	1.171	27 17	1 49.1	111 30	7 26.0	0.9354	1.2778	7.65	0.8839
		2	0.6744	17.68	1.179	26 48	1 47.2	110 28	7 21.9	0.9364	1.2774	7.70	0.8865
		3	0.6771	17.76	1.184	26 21	1 45.4	109 25	7 17.7	0.9367	1.2770	7.75	0.8890
		4	0.6798	17.81	1.187	25 58	1 43.9	108 23	7 13.5	0.9364	1.2766	7.79	0.8913
<sup>h</sup> (23.0)	5	0.6826	+17.83	+1.189	25 41	1 42.7	107 20	7 9.3	+0.9359	+1.2762	+7.82	+0.8934	
6	0.6853	17.84	1.189	25 32	1 42.1	106 18	7 5.2	0.9356	1.2759	7.86	0.8955		
7	0.6881	17.85	1.190	25 29	1 41.9	105 15	7 1.0	0.9358	1.2755	7.90	0.8974		
8	0.6908	17.89	1.192	25 31	1 42.1	104 12	6 56.8	0.9366	1.2752	7.93	0.8992		
9	0.6935	17.95	1.197	25 34	1 42.3	103 9	6 52.6	0.9384	1.2749	7.96	0.9008		
	10	0.6963	+18.06	+1.204	25 35	1 42.3	102 6	6 48.4	+0.9411	+1.2746	+7.99	+0.9023	
	11	0.6990	18.20	1.213	25 32	1 42.1	101 2	6 44.1	0.9442	1.2744	8.01	0.9037	
	12	0.7017	18.36	1.224	25 23	1 41.5	99 59	6 39.9	0.9476	1.2742	8.03	0.9049	
	13	0.7045	18.54	1.236	25 7	1 40.5	98 56	6 35.7	0.9508	1.2740	8.05	0.9061	
	14	0.7072	18.71	1.247	24 45	1 39.1	97 52	6 31.5	0.9535	1.2738	8.07	0.9071	
	15	0.7100	+18.86	+1.257	24 21	1 37.4	96 48	6 27.2	+0.9554	+1.2736	+8.09	+0.9080	
	16	0.7127	18.96	1.264	23 56	1 35.7	95 45	6 23.0	0.9565	1.2735	8.11	0.9088	
	17	0.7154	19.03	1.269	23 34	1 34.3	94 41	6 18.7	0.9568	1.2734	8.12	0.9094	
	18	0.7182	19.06	1.270	23 19	1 33.2	93 37	6 14.5	0.9565	1.2733	8.13	0.9099	
	19	0.7209	19.06	1.270	23 8	1 32.5	92 33	6 10.2	0.9559	1.2732	8.13	0.9102	
<sup>h</sup> (0.0)	20	0.7236	+19.04	+1.269	23 6	1 32.4	91 29	6 5.9	+0.9555	+1.2732	+8.14	+0.9105	
21	0.7264	19.03	1.269	23 10	1 32.7	90 25	6 1.7	0.9556	1.2731	8.14	0.9106		
22	0.7291	19.05	1.270	23 17	1 33.2	89 21	5 57.4	0.9563	1.2731	8.14	0.9105		
23	0.7319	19.10	1.273	23 25	1 33.7	88 17	5 53.1	0.9579	1.2732	8.14	0.9104		
24	0.7346	19.18	1.279	23 31	1 34.1	87 12	5 48.8	0.9602	1.2732	8.13	0.9101		
	25	0.7373	+19.31	+1.287	23 32	1 34.1	86 8	5 44.5	+0.9629	+1.2733	+8.12	+0.9097	
	26	0.7401	19.45	1.297	23 26	1 33.7	85 4	5 40.3	0.9659	1.2734	8.11	0.9092	
	27	0.7428	19.61	1.307	23 13	1 32.9	84 0	5 36.0	0.9686	1.2735	8.10	0.9085	
	28	0.7455	19.75	1.317	22 56	1 31.7	82 56	5 31.7	0.9709	1.2736	8.09	0.9077	
	29	0.7483	19.87	1.325	22 36	1 30.4	81 52	5 27.5	0.9725	1.2738	8.07	0.9068	
	30	0.7510	+19.96	+1.331	22 17	1 29.1	80 48	5 23.2	+0.9734	+1.2740	+8.05	+0.9059	
	31	0.7538	+20.01	+1.334	22 0	1 28.0	79 43	5 18.9	+0.9737	+1.2742	+8.03	+0.9047	

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .		
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
Oct.	$\gamma$												
	1	0.7538	+20.01	+1.334	22 0	1 28.0	79 43	5 18.9	+0.9737	+1.2742	+8.03	+0.9047	
	2	0.7565	20.04	1.336	21 49	1 27.3	78 39	5 14.6	0.9736	1.2745	8.01	0.9034	
	3	0.7592	20.05	1.336	21 44	1 26.9	77 35	5 10.3	0.9736	1.2747	7.98	0.9019	
	$\delta$ (1.0)	4	0.7620	20.05	1.337	21 45	1 27.0	76 31	5 6.1	0.9738	1.2750	7.95	0.9003
	5	0.7647	20.08	1.339	21 52	1 27.5	75 27	5 1.8	0.9747	1.2753	7.92	0.8986	
	6	0.7675	+20.13	+1.342	22 1	1 28.1	74 23	4 57.5	+0.9763	+1.2756	+7.88	+0.8967	
	7	0.7702	20.23	1.349	22 10	1 28.7	73 20	4 53.3	0.9788	1.2760	7.85	0.8947	
	8	0.7729	20.36	1.358	22 15	1 29.0	72 16	4 49.1	0.9820	1.2764	7.81	0.8926	
	9	0.7757	20.53	1.369	22 15	1 29.0	71 12	4 44.8	0.9855	1.2767	7.77	0.8903	
	10	0.7784	20.71	1.381	22 8	1 28.5	70 9	4 40.6	0.9890	1.2771	7.73	0.8879	
	11	0.7811	+20.89	+1.393	21 56	1 27.7	69 5	4 36.3	+0.9922	+1.2776	+7.68	+0.8854	
	12	0.7839	21.06	1.404	21 40	1 26.7	68 2	4 32.1	0.9948	1.2780	7.63	0.8827	
	13	0.7866	21.19	1.413	21 23	1 25.5	66 58	4 27.9	0.9966	1.2784	7.58	0.8798	
	14	0.7894	21.28	1.419	21 6	1 24.4	65 55	4 23.7	0.9977	1.2789	7.53	0.8768	
	15	0.7921	21.34	1.423	20 54	1 23.6	64 52	4 19.5	0.9982	1.2794	7.48	0.8737	
	16	0.7948	+21.36	+1.424	20 48	1 23.2	63 49	4 15.3	+0.9983	+1.2799	+7.42	+0.8703	
	17	0.7976	21.36	1.424	20 48	1 23.2	62 46	4 11.1	0.9983	1.2805	7.36	0.8668	
	18	0.8003	21.36	1.425	20 54	1 23.6	61 43	4 6.9	0.9987	1.2810	7.30	0.8632	
	$\epsilon$ (2.0)	19	0.8030	21.39	1.426	21 4	1 24.3	60 40	4 2.7	0.9997	1.2816	7.24	0.8594
	20	0.8058	21.45	1.430	21 15	1 25.0	59 38	3 58.5	1.0014	1.2821	7.17	0.8554	
	21	0.8085	+21.54	+1.436	21 26	1 25.7	58 35	3 54.3	+1.0039	+1.2827	+7.10	+0.8513	
	22	0.8113	21.67	1.445	21 32	1 26.1	57 33	3 50.2	1.0068	1.2833	7.03	0.8470	
	23	0.8140	21.83	1.456	21 33	1 26.2	56 31	3 46.1	1.0101	1.2839	6.96	0.8425	
	24	0.8167	22.01	1.468	21 28	1 25.9	55 29	3 41.9	1.0133	1.2845	6.88	0.8378	
	25	0.8195	22.18	1.479	21 17	1 25.1	54 27	3 37.8	1.0162	1.2851	6.81	0.8329	
	26	0.8222	+22.34	+1.489	21 3	1 24.2	53 25	3 33.7	+1.0185	+1.2857	+6.73	+0.8278	
	27	0.8249	22.46	1.498	20 48	1 23.2	52 23	3 29.5	1.0202	1.2863	6.65	0.8226	
	28	0.8277	22.55	1.504	20 34	1 22.3	51 22	3 25.5	1.0213	1.2870	6.57	0.8172	
	29	0.8304	22.61	1.508	20 25	1 21.7	50 21	3 21.4	1.0220	1.2876	6.48	0.8115	
	30	0.8332	22.65	1.510	20 21	1 21.4	49 20	3 17.3	1.0225	1.2883	6.39	0.8056	
	31	0.8359	+22.68	+1.513	20 22	1 21.5	48 19	3 13.3	+1.0233	+1.2889	+6.30	+0.7995	
Nov.	1	0.8386	22.73	1.516	20 29	1 21.9	47 18	3 9.2	1.0245	1.2896	6.21	0.7932	
	2	0.8414	22.81	1.521	20 38	1 22.5	46 17	3 5.1	1.0264	1.2902	6.12	0.7866	
	$\zeta$ (3.0)	3	0.8441	22.92	1.528	20 48	1 23.2	45 17	3 1.1	1.0290	1.2909	6.02	0.7799
	4	0.8469	23.08	1.538	20 56	1 23.7	44 16	2 57.1	1.0323	1.2915	5.93	0.7728	
	5	0.8496	+23.27	+1.551	20 59	1 23.9	43 16	2 53.1	+1.0360	+1.2922	+5.83	+0.7655	
	6	0.8523	23.48	1.566	20 56	1 23.7	42 16	2 49.1	1.0398	1.2929	5.73	0.7580	
	7	0.8551	23.70	1.581	20 48	1 23.2	41 16	2 45.1	1.0435	1.2935	5.63	0.7501	
	8	0.8578	23.91	1.594	20 35	1 22.3	40 16	2 41.1	1.0467	1.2942	5.52	0.7421	
	9	0.8605	24.09	1.606	20 21	1 21.4	39 16	2 37.1	1.0492	1.2948	5.42	0.7337	
	10	0.8633	+24.23	+1.616	20 6	1 20.4	38 17	2 33.1	+1.0511	+1.2955	+5.31	+0.7249	
	11	0.8660	24.33	1.623	19 54	1 19.6	37 18	2 29.2	1.0524	1.2961	5.20	0.7159	
	12	0.8688	24.40	1.627	19 46	1 19.1	36 18	2 25.2	1.0532	1.2967	5.09	0.7066	
	13	0.8715	24.45	1.630	19 43	1 18.9	35 19	2 21.3	1.0539	1.2973	4.98	0.6968	
	14	0.8742	24.49	1.633	19 46	1 19.1	34 20	2 17.3	1.0548	1.2980	4.86	0.6867	
	15	0.8770	+24.55	+1.637	19 54	1 19.6	33 22	2 13.4	+1.0561	+1.2986	+4.75	+0.6763	
	16	0.8797	+24.63	+1.642	20 3	1 20.2	32 23	2 9.5	+1.0580	+1.2992	+4.63	+0.6654	



## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Std. Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .	
		In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.					
Nov.	y	"	"	o	h m	o	h m					
	16	0.8797	+24.63	+1.642	20 3	1 20.2	32 23	2 9.5	+1.0580	+1.2992	+4.63	+0.6654
	17	0.8824	24.75	1.650	20 12	1 20.8	31 25	2 5.7	1.0605	1.2998	4.50	0.6541
	18	0.8852	24.91	1.661	20 18	1 21.2	30 26	2 1.7	1.0636	1.3004	4.39	0.6425
	19	0.8879	25.10	1.674	20 19	1 21.3	29 28	1 57.9	1.0670	1.3009	4.27	0.6302
	<sup>h</sup> (4.0) 20	0.8907	25.31	1.688	20 15	1 21.0	28 30	1 54.0	1.0704	1.3015	4.15	0.6175
	21	0.8934	+25.53	+1.702	20 5	1 20.3	27 32	1 50.1	+1.0737	+1.3020	+4.02	+0.6043
	22	0.8961	25.73	1.715	19 52	1 19.5	26 34	1 46.3	1.0765	1.3026	3.90	0.5905
	23	0.8989	25.90	1.727	19 37	1 18.5	25 36	1 42.4	1.0787	1.3031	3.77	0.5762
	24	0.9016	26.04	1.736	19 23	1 17.5	24 39	1 38.6	1.0804	1.3036	3.64	0.5611
	25	0.9043	26.15	1.743	19 11	1 16.7	23 41	1 34.7	1.0816	1.3041	3.51	0.5455
	26	0.9071	+26.23	+1.748	19 3	1 16.2	22 44	1 30.9	+1.0826	+1.3046	+3.38	+0.5290
	27	0.9098	26.30	1.753	19 0	1 16.0	21 47	1 27.1	1.0837	1.3050	3.25	0.5118
	28	0.9126	26.38	1.758	19 2	1 16.1	20 49	1 23.3	1.0851	1.3055	3.12	0.4938
	29	0.9153	26.48	1.765	19 7	1 16.5	19 52	1 19.5	1.0870	1.3059	2.98	0.4748
30	0.9180	26.62	1.775	19 13	1 16.9	18 55	1 15.7	1.0895	1.3063	2.85	0.4547	
Dec.	1	0.9208	+26.80	+1.787	19 18	1 17.2	17 59	1 11.9	+1.0926	+1.3067	+2.71	+0.4335
	2	0.9235	27.02	1.800	19 19	1 17.3	17 2	1 8.1	1.0961	1.3071	2.58	0.4111
	3	0.9262	27.26	1.816	19 15	1 17.0	16 5	1 4.3	1.0999	1.3075	2.44	0.3874
	4	0.9290	27.52	1.833	19 7	1 16.5	15 8	1 0.5	1.1037	1.3078	2.30	0.3621
	<sup>h</sup> (5.0) 5	0.9317	27.76	1.850	18 54	1 15.6	14 12	0 56.8	1.1070	1.3081	2.16	0.3351
	6	0.9345	+27.99	+1.865	18 38	1 14.5	13 15	0 53.0	+1.1097	+1.3084	+2.02	+0.3062
	7	0.9372	28.18	1.878	18 22	1 13.5	12 19	0 49.3	1.1119	1.3087	1.88	0.2749
	8	0.9399	28.33	1.888	18 7	1 12.5	11 22	0 45.5	1.1135	1.3090	1.74	0.2412
	9	0.9427	28.43	1.895	17 55	1 11.7	10 26	0 41.7	1.1147	1.3093	1.60	0.2045
	10	0.9454	28.52	1.900	17 47	1 11.1	9 30	0 38.0	1.1157	1.3095	1.46	0.1642
	11	0.9482	+28.59	+1.905	17 44	1 10.9	8 33	0 34.2	+1.1166	+1.3097	+1.32	+0.1196
	12	0.9509	28.67	1.910	17 46	1 11.1	7 37	0 30.5	1.1179	1.3099	1.18	0.0698
	13	0.9536	28.77	1.916	17 49	1 11.3	6 41	0 26.7	1.1196	1.3100	1.03	0.0132
	14	0.9564	28.90	1.927	17 54	1 11.6	5 45	0 23.0	1.1218	1.3102	0.89	9.9480
	15	0.9591	29.08	1.939	17 56	1 11.7	4 49	0 19.3	1.1244	1.3102	0.74	9.8711
	16	0.9618	+29.29	+1.952	17 55	1 11.7	3 53	0 15.5	+1.1275	+1.3104	+0.60	+9.7773
	17	0.9646	29.52	1.967	17 50	1 11.3	2 57	0 11.8	1.1307	1.3105	0.46	9.6590
	18	0.9673	29.75	1.983	17 39	1 10.6	2 1	0 8.1	1.1337	1.3105	0.31	9.4928
	19	0.9701	29.98	1.999	17 25	1 9.7	1 5	0 4.3	1.1364	1.3106	0.17	9.3201
	<sup>h</sup> (6.0) 20	0.9728	30.18	2.012	17 9	1 8.6	0 8	0 0.5	1.1387	1.3106	+0.02	+8.0034
	21	0.9755	+30.35	+2.023	16 52	1 7.5	359 12	23 56.8	+1.1405	+1.3106	-0.12	-9.0899
	22	0.9783	30.48	2.032	16 36	1 6.4	358 16	23 53.1	1.1418	1.3105	0.27	9.4281
	23	0.9810	30.59	2.039	16 24	1 5.6	357 20	23 49.3	1.1428	1.3105	0.41	9.6150
	24	0.9837	30.67	2.045	16 16	1 5.1	356 24	23 45.6	1.1437	1.3104	0.56	9.7459
	25	0.9865	30.76	2.051	16 13	1 4.9	355 28	23 41.9	1.1448	1.3103	0.70	9.8457
	26	0.9892	+30.87	+2.058	16 12	1 4.8	354 32	23 38.1	+1.1463	+1.3102	-0.85	-9.9269
	27	0.9920	31.00	2.067	16 14	1 4.9	353 36	23 34.4	1.1482	1.3101	0.99	9.9952
	28	0.9947	31.18	2.078	16 15	1 5.0	352 39	23 30.6	1.1507	1.3099	1.13	0.0539
	29	0.9974	31.39	2.092	16 14	1 4.9	351 43	23 26.9	1.1536	1.3098	1.28	0.1059
	30	1.0002	31.63	2.109	16 9	1 4.6	350 47	23 23.1	1.1568	1.3096	1.42	0.1520
	31	1.0029	+31.89	+2.126	16 0	1 4.0	349 50	23 19.3	+1.1600	+1.3093	-1.56	-0.1934
	32	1.0056	+32.15	+2.143	15 47	1 3.1	348 54	23 15.6	+1.1630	+1.3091	-1.70	-0.2312

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Name of Star.	Magni- tude.	Right Ascension.			Annual Variation.	Declination.	Annual Variation.
		<sup>h</sup>	<sup>m</sup>	<sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
$\alpha$ Andromedæ . . .	2.0	0	2	35.934	+ 3.0911	+ 28° 28' 19.31	+ 19.885
$\beta$ Cassiopeæ . . .	2.0	0	3	12.248	3.1733	+ 58 31 54.11	19.852
$\gamma$ Andromedæ . . .	5.3	0	4	30.075	3.1018	+ 45 26 55.62	20.036
$\delta$ Draconis (H.) . . S. P.	4.7	0	6	57.018	2.8877	+ 101 45 40.98	20.023
$\gamma$ Pegasi ( <i>Algenib</i> ) . .	2.7	0	7	28.120	3.0835	+ 14 33 39.00	20.024
$\sigma$ Andromedæ . . .	4.3	0	12	28.674	+ 3.1227	+ 36 . 9 50.98	+ 19.985
$\epsilon$ Ceti . . .	3.3	0	13	43.122	3.0520	— 9 26 42.42	19.959
$\delta$ Ursæ Minoris . . S. P.	6.0	0	14	20.008	0.1410	+ 91 40 44.69	19.941
$\delta$ Piscium . . .	6.0	0	19	39.663	3.0729	+ 1 19 9.72	19.955
$\beta$ Hydri . . .	3.0	0	19	51.082	3.2332	— 77 53 6.37	20.285
$\gamma$ Ceti . . .	6.0	0	24	19.366	+ 3.0610	— 4 34 34.34	+ 19.939
$\alpha$ Draconis . . . S. P.	3.3	0	28	42.041	2.5926	+ 109 35 39.78	19.891
$\pi$ Andromedæ . . .	4.0	0	30	53.955	3.1903	+ 33 6 9.40	19.875
$\alpha$ Cassiopeæ ( <i>var.</i> ) . .	2.5	0	34	9.303	3.3729	+ 55 55 22.45	19.790
$\beta$ Ceti . . .	2.0	0	37	58.063	3.0143	— 18 36 5.72	19.803
$\gamma$ Cassiopeæ . . .	6.0	0	38	15.507	+ 3.8552	+ 74 22 32.56	+ 19.754
$\delta$ Cassiopeæ . . .	5.0	0	38	29.106	3.3186	+ 47 40 16.24	19.756
$\delta$ Piscium . . .	4.3	0	42	52.274	3.1069	+ 6 58 31.17	19.650
$\gamma$ Camelop. (H.) . . S. P.	4.7	0	48	18.675	0.3897	+ 95 58 42.05	19.597
$\gamma$ Cassiopeæ . . .	2.0	0	49	57.123	3.5780	+ 60 6 35.83	19.566
$\mu$ Andromedæ . . .	4.0	0	50	32.233	+ 3.3106	+ 37 53 30.25	+ 19.619
$\delta$ Cephei (H.) . . .	4.3	0	53	33.741	7.2152	+ 85 39 21.01	19.507
$\epsilon$ Piscium . . .	4.0	0	57	7.821	3.1089	+ 7 17 12.97	19.456
$\beta$ Andromedæ . . .	2.3	1	3	27.737	3.3438	+ 35 1 35.39	19.167
$\alpha$ Tucanæ . . .	5.0	1	11	58.300	2.0557	— 69 28 15.49	19.170
$f$ Piscium . . .	5.0	1	12	1.282	+ 3.0898	+ 3 . 1 27.67	+ 19.037
$\alpha$ Ursæ Minoris ( <i>Polaris</i> )	2.0	1	17	44.827	22.9800	+ 88 42 40.60	18.910
$\theta^1$ Ceti . . .	3.0	1	18	25.495	2.9970	— 8 45 41.49	18.671
$\gamma$ Cassiopeæ . . .	6.3	1	22	54.174	4.3757	+ 69 41 15.92	18.680
$\alpha$ Octantis . . . S. P.	5.0	1	22	58.154	8.6470	— 94 47 19.88	18.785
$\gamma$ Piscium . . .	3.7	1	25	29.419	+ 3.2023	+ 14 46 5.46	+ 18.667
$\nu$ Andromedæ . . .	4.0	1	30	13.517	3.5038	+ 40 50 42.28	18.150
$\pi$ Piscium . . .	5.7	1	31	9.663	3.1703	+ 11 34 6.32	18.530
$\alpha$ Eridani ( <i>Achernar</i> ) . .	1.0	1	33	32.230	2.2326	— 57 48 21.53	18.359
$\nu$ Piscium . . .	4.7	1	35	36.174	3.1174	+ 4 55 13.95	18.333
$\alpha$ Piscium . . .	4.3	1	39	28.771	+ 3.1621	+ 8 35 36.84	+ 18.220
$\gamma$ Ceti . . .	3.0	1	45	55.924	2.9617	— 10 53 22.61	17.827
$\beta$ Arietis . . .	3.0	1	48	27.182	3.3033	+ 20 15 36.64	17.732
$\gamma$ Cassiopeæ . . .	4.0	1	53	52.821	5.0085	+ 71 52 43.61	17.651
$\gamma$ Andromedæ . . .	2.3	1	57	1.527	3.6598	+ 41 47 30.52	17.447
$\alpha$ Arietis . . .	2.0	2	0	51.605	+ 3.3707	+ 22 55 56.69	+ 17.177
$\alpha$ Draconis . . . S. P.	3.3	2	1	21.483	1.6237	+ 115 . 5 19.69	17.301
$\beta$ Trianguli . . .	3.0	2	2	52.821	3.5539	+ 34 27 25.44	17.209
$\gamma^1$ Ceti . . .	4.3	2	7	3.839	+ 3.1739	+ 8 19 15.20	17.034
$\delta$ Ursæ Minoris . . S. P.	5.0	2	9	17.670	— 0.3250	+ 101 55 34.14	16.908
$\gamma$ Trianguli . . .	4.3	2	10	39.405	+ 3.5504	+ 33 19 43.51	+ 16.850
$\gamma$ Ceti . . .	6.0	2	11	23.791	2.9894	— 6 56 19.67	16.736
$\epsilon$ Cassiopeæ . . .	4.0	2	19	50.427	4.8603	+ 66 53 53.33	16.439
$\delta$ Hydri . . .	4.0	2	19	45.506	1.0542	— 69 10 8.85	16.450
$\gamma^2$ Ceti . . .	4.0	2	22	12.271	+ 3.1836	+ 7 57 27.14	+ 16.300

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Name of Star.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
5 Ursæ Minoris . . . S. P.	4.7	<sup>h</sup> 2 <sup>m</sup> 27 <sup>s</sup> 46.180	— 0.1919	+ 103° 48' 22.13	+ 16.011
* δ Ceti . . . . .	4.0	2 33 44.523	+ 3.0728	— 0 9 19.10	15.702
* μ Hydri . . . . .	6.0	2 34 3.414	— 1.4391	— 79 35 51.60	15.680
* θ Persei . . . . .	4.0	2 36 33.129	+ 4.0690	+ 48 45 14.51	15.464
γ Ceti . . . . .	3.3	2 37 29.820	3.1031	+ 2 45 47.88	15.344
* σ Arietis . . . . .	5.7	2 45 18.552	+ 3.3043	+ 14 37 11.76	+ 15.013
β Ursæ Minoris . . . S. P.	2.0	2 51 2.289	— 0.2325	+ 105 23 12.51	14.719
* 47 Cephei (H.) . . .	6.0	2 51 13.390	+ 7.5152	+ 78 58 28.79	14.708
* ε Arietis . . . . .	4.3	2 52 48.486	3.4208	+ 20 53 30.70	14.611
α Ceti . . . . .	2.3	2 56 25.478	3.1302	+ 3 38 59.23	14.314
* β Persei ( <i>Algol</i> ) ( <i>var.</i> )	2.7	3 0 52.928	+ 3.8831	+ 40 31 24.07	+ 14.127
48 Cephei (H.) . . .	6.3	3 6 7.888	7.4018	+ 77 19 18.51	13.743
ζ Arietis . . . . .	4.7	3 8 27.836	3.4391	+ 20 37 43.48	13.562
α Persei . . . . .	2.0	3 16 19.746	4.2568	+ 49 27 42.14	13.100
* ρ Octantis . . . . S. P.	6.0	3 17 34.930	+ 12.9580	— 95 54 38.90	13.008
* ι Hydri . . . . .	5.0	3 18 45.867	— 1.6011	— 77 47 49.46	+ 13.027
γ <sup>3</sup> Ursæ Minoris . . . S. P.	3.0	3 20 54.679	— 0.1347	+ 107 46 2.92	12.811
* f Tauri . . . . .	4.0	3 24 41.355	+ 3.3048	+ 12 33 8.09	12.570
ε Eridani . . . . .	3.0	3 27 39.213	2.8236	— 9 50 15.79	12.399
δ Persei . . . . .	3.3	3 34 57.151	4.2494	+ 47 25 42.55	11.818
* γ Camelopardalis (H.)	4.3	3 38 32.646	+ 6.2361	+ 70 59 8.92	+ 11.556
η Tauri . . . . .	3.0	3 40 49.596	3.5556	+ 23 45 28.91	11.387
ζ Persei . . . . .	3.0	3 47 5.534	+ 3.7599	+ 31 33 0.39	10.957
ζ Ursæ Minoris . . . S. P.	4.3	3 48 4.446	— 2.2543	+ 101 51 40.93	10.917
* γ Hydri . . . . .	3.3	3 48 58.749	— 0.9983	— 74 34 55.20	10.979
* ε Persei . . . . .	3.3	3 50 20.274	+ 4.0094	+ 39 41 7.10	+ 10.730
γ Eridani . . . . .	3.0	3 52 48.273	2.7985	— 13 49 39.84	10.451
* A <sup>1</sup> Tauri . . . . .	4.7	3 58 4.457	3.5397	+ 21 46 29.66	10.090
* c Persei . . . . .	4.0	4 0 31.896	4.3366	+ 47 24 44.87	9.950
Groombr. 2320 . . . S. P.	6.3	4 6 0.904	0.1392	+ 111 53 40.87	9.499
* o <sup>1</sup> Eridani . . . . .	4.3	4 6 23.897	+ 2.9264	— 7 7 49.24	+ 9.623
γ Tauri . . . . .	4.0	4 13 25.191	+ 3.4088	+ 15 21 23.16	8.965
* η Ursæ Minoris . . . S. P.	5.0	4 20 47.104	— 1.8180	+ 103 59 12.71	8.159
ε Tauri . . . . .	3.7	4 22 4.593	+ 3.4973	+ 18 55 52.29	8.265
η Draconis . . . . S. P.	2.7	4 22 28.642	0.8061	+ 118 13 55.88	8.224
* m Persei . . . . .	6.0	4 25 32.128	+ 4.2097	+ 42 49 24.80	+ 8.016
* δ Mensæ . . . . .	6.0	4 25 34.379	— 4.2278	— 80 28 33.34	8.036
A Draconis . . . . S. P.	5.0	4 28 12.446	— 0.1355	+ 110 59 23.07	7.798
α Tauri ( <i>Aldebaran</i> ) .	1.0	4 29 29.639	+ 3.4372	+ 16 16 59.98	7.523
* τ Tauri . . . . .	4.3	4 35 31.367	3.5952	+ 22 44 28.09	7.193
α Camelopardalis . .	4.7	4 42 54.966	+ 5.9240	+ 66 9 3.44	+ 6.617
* i Tauri . . . . .	5.3	4 44 49.334	3.5052	+ 18 38 53.93	6.414
ι Aurigæ . . . . .	3.0	4 49 42.014	3.9004	+ 32 59 16.18	6.034
* ζ Aurigæ . . . . .	4.0	4 54 38.973	+ 4.1848	+ 40 54 40.80	5.635
ε Ursæ Minoris . . . S. P.	4.3	4 57 28.276	— 6.3360	+ 97 46 47.04	5.406
11 Orionis . . . . .	5.0	4 58 10.130	+ 3.4243	+ 15 14 50.08	+ 5.306
* β Eridani . . . . .	3.0	5 2 20.617	2.9483	— 5 13 54.91	4.933
α Aurigæ ( <i>Capella</i> ) .	1.0	5 8 24.941	4.4245	+ 45 52 58.62	4.041
β Orionis ( <i>Rigel</i> ) . .	1.0	5 9 9.315	2.8812	— 8 19 54.33	4.406
* τ Orionis . . . . .	4.0	5 12 10.081	+ 2.9123	— 6 57 58.71	+ 4.144

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		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
$\beta$ Tauri . . . . .	2.0	5 19 12.717	+ 3.7891	+ 28 30 42.75	+ 3.370
Groombridge 966 . . . . .	6.3	5 24 45.555	7.9996	+ 74 58 3.56	3.091
$\gamma$ Aurigæ . . . . .	5.0	5 25 26.368	3.9048	+ 32 6 30.66	3.033
Groombridge 944 . . . . .	6.3	5 26 11.052	18.6430	+ 85 8 16.67	2.961
$\delta$ Orionis ( <i>var.</i> ) . . . . .	2.5	5 26 17.083	3.0633	— 0 22 58.19	2.935
$\alpha$ Leporis . . . . .	3.0	5 27 47.428	+ 2.6447	— 17 54 11.23	+ 2.809
$\epsilon$ Orionis . . . . .	2.0	5 30 31.809	3.0423	— 1 16 27.13	2.572
$\alpha$ Columbæ . . . . .	2.0	5 35 35.667	+ 2.1727	— 34 8 3.83	2.087
$\omega$ Draconis . . . S. P.	5.0	5 37 36.510	— 0.3540	+ 111 11 25.44	1.632
$\kappa$ Orionis . . . . .	2.7	5 42 26.651	+ 2.8447	— 9 42 36.53	1.538
$\nu$ Aurigæ . . . . .	4.0	5 43 43.610	+ 4.1540	+ 39 6 52.57	+ 1.459
$\phi^1$ Draconis . . . S. P.	4.3	5 43 55.836	— 1.0794	+ 107 47 47.44	1.678
$\delta$ Doradus . . . . .	4.3	5 44 34.544	+ 0.1048	— 65 46 38.87	1.329
$\alpha$ Orionis ( <i>var.</i> ) . . . . .	1.2	5 49 6.491	3.2469	+ 7 23 7.22	0.960
$\beta$ Aurigæ . . . . .	2.0	5 51 18.808	4.4015	+ 44 56 5.49	0.750
$\theta$ Aurigæ . . . . .	3.0	5 52 5.071	+ 4.0918	+ 37 12 13.45	+ 0.604
$\nu$ Orionis . . . . .	4.7	6 1 10.689	3.4273	+ 14 46 51.42	— 0.133
22 Camelopardalis (H.) . . . . .	4.7	6 6 29.968	6.8175	+ 69 21 26.97	0.687
$\gamma$ Geminorum . . . . .	3.3	6 8 7.054	+ 3.6227	+ 22 32 18.21	0.725
$\delta$ Ursæ Minoris . . S. P.	4.3	6 8 26.569	— 19.4620	+ 93 23 19.76	0.790
$\mu$ Geminorum . . . . .	3.0	6 16 11.111	+ 3.6315	+ 22 34 12.39	— 1.537
$\phi^1$ Aurigæ . . . . .	5.3	6 16 16.364	4.6267	+ 49 20 37.98	1.434
$\alpha$ Argus ( <i>Canopus</i> ) . . . . .	1.0	6 21 28.026	1.3304	— 52 38 4.94	1.867
$\nu$ Geminorum . . . . .	4.7	6 22 18.764	+ 3.5631	+ 20 16 55.59	1.971
$\chi$ Draconis . . . S. P.	4.0	6 23 4.495	— 1.0791	+ 107 18 57.81	1.640
$\gamma$ Geminorum . . . . .	2.3	6 31 14.507	+ 3.4674	+ 16 29 38.47	— 2.773
$\epsilon$ Geminorum . . . . .	3.3	6 37 2.460	3.6936	+ 25 14 28.07	3.239
$\phi^5$ Aurigæ . . . . .	5.7	6 38 39.918	4.3291	+ 43 41 16.19	3.220
$\dagger$ $\alpha$ Canis Majoris ( <i>Sirius</i> ) . . . . .	1.0	6 40 12.771	2.6437	— 16 33 47.30	4.708
$\theta$ Geminorum . . . . .	3.3	6 45 24.450	3.9606	+ 34 5 43.52	3.979
51 Cephei (H.) . . . . .	5.3	6 47 45.601	+ 29.9400	+ 87 13 12.84	— 4.241
$\zeta$ Mensæ . . . . .	5.8	6 49 21.363	— 4.8997	— 80 41 41.04	4.204
50 Draconis . . . S. P.	6.0	6 49 58.876	— 1.9072	+ 104 41 54.73	4.414
$\epsilon$ Canis Majoris . . . . .	1.7	6 54 13.473	+ 2.3577	— 28 49 13.12	4.713
$\zeta$ Geminorum ( <i>var.</i> ) . . . . .	4.0	6 57 27.998	3.5627	+ 20 44 1.21	4.994
$\delta$ Canis Majoris . . . . .	2.0	7 3 50.239	+ 2.4385	— 26 12 57.07	— 5.504
63 Aurigæ . . . . .	5.0	7 3 57.094	4.1368	+ 39 30 8.65	5.504
25 Camelopardalis . . . . .	4.7	7 7 28.728	+ 12.9660	+ 82 37 28.18	5.851
$\gamma^2$ Volantis ( <i>var.</i> ) . . . . .	4.7	7 9 41.575	— 0.4932	— 70 19 1.86	6.008
$\delta$ Draconis . . . S. P.	3.0	7 12 31.680	+ 0.0299	+ 112 32 7.71	6.326
$\delta$ Geminorum . . . . .	3.3	7 13 26.044	+ 3.5880	+ 22 11 15.70	— 6.332
$\tau$ Draconis . . . S. P.	4.7	7 17 42.254	— 1.1162	+ 106 51 9.70	6.778
Piazzii vii. 67 . . . . .	6.0	7 19 13.391	+ 6.2999	+ 68 41 35.01	6.832
$\beta$ Canis Minoris . . . . .	3.0	7 21 4.634	3.2599	+ 8 30 51.05	6.984
$\omega^2$ Geminorum ( <i>Castor</i> ) . . . . .	1.7	7 27 27.255	3.8386	+ 32 8 0.25	7.545
$\dagger$ $\alpha$ Canis Min. ( <i>Procyon</i> ) . . . . .	1.0	7 33 26.335	+ 3.1435	+ 5 30 40.74	— 8.988
$\lambda$ Ursæ Minoris . . S. P.	6.3	7 35 44.175	— 64.4780	+ 91 2 15.56	8.145
$\beta$ Geminorum ( <i>Pollux</i> ) . . . . .	1.3	7 38 27.738	+ 3.6795	+ 28 17 45.28	8.409
26 Lynceis . . . . .	6.0	7 46 33.322	4.3888	+ 47 51 14.02	9.012
$\phi$ Geminorum . . . . .	5.0	7 46 38.564	+ 3.6801	+ 27 3 17.85	— 9.022

\* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

† Periodic corrections given in the Appendix are still to be applied to the positions of Sirius and Procyon.

MEAN PLACES FOR 1888.0. (January 0 <sup>d</sup> .196, Washington.)					
Name of Star.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
* Groombridge 1374 . . . . .	5.7	<sup>h</sup> 7 <sup>m</sup> 46 46.422	+ 7.2888	+ 74° 12' 55".87	— 9.051
ε Draconis . . . S. P.	3.7	7 48 32.813	— 0.1786	+ 110 1 2.34	9.174
* ω <sup>1</sup> Cancri . . . . .	6.0	7 54 9.275	+ 3.6375	+ 25 41 55.70	9.573
3 Ursæ Majoris (H.) . . . .	5.7	8 1 39.733	6.0507	+ 68 48 8.89	10.150
15 Argus (ρ) . . . . .	3.0	8 2 46.461	2.5544	— 23 58 54.93	10.190
* ζ <sup>1</sup> Cancri . . . . .	4.7	8 5 47.305	+ 3.4466	+ 17 59 3.34	— 10.597
* β Cancri . . . . .	3.7	8 10 26.463	+ 3.2589	+ 9 31 47.78	10.851
* κ Cephei (pr.) . . . S. P.	4.3	8 12 38.803	— 1.9208	+ 102 37 34.40	10.998
* 30 Monocerotis . . . . .	3.7	8 20 3.824	+ 3.0002	— 3 32 29.72	11.501
* θ Chamæleontis . . . . .	4.7	8 23 59.038	— 1.7080	— 77 7 22.01	11.764
η Cancri . . . . .	5.7	8 26 13.937	+ 3.4785	+ 20 49 15.47	— 11.998
Groombr. 3241 . . . S. P.	6.3	8 30 29.100	— 0.2189	+ 107 50 52.10	12.221
* σ Hydræ . . . . .	5.0	8 32 54.296	+ 3.1462	+ 3 44 2.47	12.429
* γ Cancri . . . . .	4.3	8 36 48.270	3.4808	+ 21 52 14.13	12.719
ε Hydræ . . . . .	3.3	8 40 50.705	3.1819	+ 6 49 44.88	13.000
* σ <sup>2</sup> Cancri (mean) . . . . .	5.7	8 47 24.633	+ 3.6738	+ 31 0 10.51	— 13.402
ι Ursæ Majoris . . . . .	3.0	8 51 32.200	+ 4.1340	+ 48 28 50.56	13.898
12 Year Cat. 1879 . . . S. P.	6.0	8 52 38.746	— 2.5446	+ 99 52 5.52	13.687
σ <sup>2</sup> Ursæ Majoris . . . . .	5.0	9 0 31.802	+ 5.3567	+ 67 35 18.31	14.268
* κ Cancri . . . . .	5.0	9 1 40.878	3.2560	+ 11 7 6.46	14.286
* θ Hydræ . . . . .	4.0	9 8 32.257	+ 3.1265	+ 2 47 10.44	— 15.014
* β Argus . . . . .	1.5	9 11 58.057	0.6782	— 69 15 21.22	14.804
ι Argus . . . . .	2.0	9 14 5.372	1.6012	— 58 48 18.60	14.995
* α Lyncis . . . . .	3.3	9 14 13.810	3.6695	+ 34 51 55.52	15.021
α Cephei . . . . . S. P.	2.7	9 15 54.383	1.4366	+ 117 53 19.89	15.171
1 Draconis (H.) . . . . .	4.3	9 21 3.761	+ 9.0105	+ 81 49 12.83	— 15.439
α Hydræ . . . . .	2.0	9 22 5.026	2.9491	— 8 10 24.90	15.448
d Ursæ Majoris . . . . .	4.7	9 24 33.920	5.4032	+ 70 19 18.44	15.555
θ Ursæ Majoris . . . . .	3.0	9 25 21.715	4.0419	+ 52 11 13.76	16.214
β Cephei (pr.) . . . S. P.	3.0	9 27 12.716	0.7946	+ 109 55 51.43	15.755
* 10 Leonis Minoris . . . . .	4.7	9 27 21.683	+ 3.6945	+ 36 53 39.60	— 15.778
* o Leonis . . . . .	3.7	9 35 10.368	+ 3.9070	+ 10 24 5.04	16.218
* ζ Chamæleontis . . . . .	5.0	9 37 9.497	— 1.5582	— 80 26 16.40	16.289
ε Leonis . . . . .	3.0	9 39 29.601	+ 3.4153	+ 24 17 22.15	16.422
11 Cephei . . . . . S. P.	5.0	9 40 16.830	0.9018	+ 109 12 15.03	16.538
μ Leonis . . . . .	4.0	9 46 23.596	+ 3.4223	+ 26 32 2.52	— 16.793
* 19 Leonis Minoris . . . . .	5.3	9 50 49.413	3.6958	+ 41 35 18.78	16.957
79 Draconis . . . . . S. P.	6.3	9 51 28.178	0.7298	+ 106 49 38.97	17.013
* π Leonis . . . . .	5.0	9 54 17.680	3.1743	+ 8 34 52.21	17.137
α Leonis (Regulus) . . . . .	1.3	10 2 24.428	3.2008	+ 12 30 51.31	17.472
32 Ursæ Majoris . . . . .	6.0	10 9 53.604	+ 4.4224	+ 65 39 59.34	— 17.809
* λ Ursæ Majoris . . . . .	3.3	10 10 20.403	3.6402	+ 43 28 22.91	17.870
γ <sup>1</sup> Leonis . . . . .	2.0	10 13 47.840	3.3151	+ 20 24 27.94	18.084
* μ Hydræ . . . . .	4.0	10 20 40.470	2.9005	— 16 15 54.37	18.309
* β Leonis Minoris . . . . .	4.3	10 21 24.347	3.4870	+ 37 16 51.02	18.314
* α Antliæ . . . . .	4.0	10 22 1.599	+ 2.7390	— 30 29 53.37	— 18.216
9 Draconis (H.) . . . . .	4.7	10 25 33.737	5.2668	+ 76 17 21.90	18.390
ρ Leonis . . . . .	4.0	10 26 54.855	3.1643	+ 9 52 57.42	18.430
226 Cephei (B.) . . . S. P.	5.3	10 30 18.381	1.0779	+ 104 21 2.69	18.528
* β Octantis . . . . . S. P.	4.7	10 34 33.510	+ 6.4940	— 98 1 55.31	— 18.677

\* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

MEAN PLACES FOR 1888.0. (January 0<sup>d</sup>.196, Washington.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>		
* 41 Leonis Minoris . . .	5.7	10 37 19.542	+ 3.2713	+ 23 46 28.18	— 18.735
γ Argus ( <i>var.</i> ) . . .	1-6	10 40 42.963	2.3131	— 59 5 44.96	18.869
l Leonis . . .	5.3	10 43 22.227	3.1586	+ 11 8 15.37	18.971
* 33 Chamæleonis . . .	5.0	10 44 43.616	0.6391	— 79 56 59.08	18.981
c Cephei . . . S. P.	3.3	10 45 41.558	2.1215	+ 114 23 19.10	18.876
* 46 Leonis Minoris . . .	4.0	10 47 2.821	+ 3.3700	+ 34 49 7.08	— 19.293
* Groombridge 1706 . . .	6.0	10 50 58.401	4.9744	+ 78 22 11.83	19.178
α Ursæ Majoris . . .	2.0	10 56 48.644	+ 3.7486	+ 62 21 19.72	19.362
* γ Octantis . . .	6.0	11 0 5.359	— 0.2094	— 83 59 29.06	19.372
* p <sup>3</sup> Leonis . . .	6.0	11 1 11.445	+ 3.0622	+ 2 33 47.43	19.486
* φ Ursæ Majoris . . .	3.3	11 3 21.884	+ 3.3939	+ 45 6 20.61	— 19.503
δ Leonis . . .	2.3	11 8 9.104	3.1985	+ 21 8 13.78	19.685
* υ Ursæ Majoris . . .	3.3	11 12 25.838	3.2580	+ 33 42 19.23	19.572
δ Crateris . . .	3.3	11 13 44.501	2.9963	— 14 10 21.67	19.463
o Cephei . . . S. P.	5.3	11 14 1.779	2.4434	+ 112 30 4.11	19.669
τ Leonis . . .	5.0	11 22 10.642	+ 3.0861	+ 3 28 22.58	— 19.802
λ Draconis . . .	3.3	11 24 44.754	3.6230	+ 69 56 56.82	19.837
* ξ Hydræ . . .	4.0	11 27 29.597	2.9427	— 31 14 17.17	19.883
υ Leonis . . .	5.0	11 31 12.860	3.0713	— 0 12 19.87	19.860
γ Cephei . . . S. P.	3.3	11 34 45.135	2.4143	+ 102 59 34.18	20.075
* ζ Ursæ Majoris . . .	3.7	11 40 8.096	+ 3.1910	+ 48 24 1.18	— 19.960
β Leonis . . .	2.0	11 43 20.803	3.0641	+ 15 11 53.09	20.119
γ Ursæ Majoris . . .	2.3	11 47 56.300	3.1824	+ 54 19 2.51	20.027
Groombr. 4163 . . . S. P.	7.0	11 49 23.481	2.8638	+ 106 12 46.68	20.023
* π Virginis . . .	4.3	11 55 8.001	3.0752	+ 7 14 19.80	20.088
o Virginis . . .	4.0	11 59 30.224	+ 3.0576	+ 9 21 18.16	— 20.015
* ε Corvi . . .	3.0	12 4 21.868	3.0828	— 21 59 48.46	20.050
4 Draconis (H.) . . .	4.7	12 6 57.018	2.8877	+ 78 14 19.02	20.023
γ Corvi . . .	2.0	12 10 2.808	3.0794	— 16 55 12.16	20.018
* 2 Canum Venaticorum . . .	5.3	12 10 30.780	3.0223	+ 41 17 1.58	20.067
β Chamæleonis . . .	5.0	12 11 47.483	+ 3.3706	— 78 41 24.31	— 19.984
γ Virginis . . .	3.3	12 14 10.563	3.0686	— 0 2 39.83	20.042
* 6 Ursæ Minoris . . .	6.0	12 14 20.008	0.1410	+ 88 19 15.31	19.941
α <sup>1</sup> Crucis . . .	1.0	12 20 22.432	3.2915	— 62 28 41.66	20.016
* δ <sup>2</sup> Corvi . . .	2.3	12 24 4.285	3.1023	— 15 53 29.84	20.088
* β Canum Venaticorum . . .	4.3	12 28 25.397	+ 2.8598	+ 41 57 57.92	— 19.616
β Corvi . . .	2.3	12 28 30.264	3.1414	— 22 46 38.34	19.964
* κ Draconis . . .	3.3	12 28 42.041	2.5926	+ 70 24 20.22	19.891
* γ Virginis ( <i>mean</i> ) . . .	2.7	12 35 59.135	3.0381	— 0 50 6.79	19.813
21 Cassiopeæ . . . S. P.	6.0	12 38 15.507	3.8552	+ 105 37 27.44	19.754
* 31 Comæ Berenices . . .	5.0	12 46 14.665	+ 2.9303	+ 28 9 0.60	— 19.663
32 <sup>a</sup> Camelopardalis (H.) . . .	4.7	12 48 18.675	0.3897	+ 84 1 17.95	19.597
* γ Cassiopeæ . . . S. P.	2.0	12 49 57.123	3.5779	+ 119 53 24.17	19.565
α Canum Venaticorum . . .	2.7	12 50 47.330	2.157	+ 38 55 23.95	19.514
* 43 Cephei (H.) . . . S. P.	4.3	12 53 33.741	7.2152	+ 94 20 38.99	19.507
* δ Muscæ . . .	4.0	12 54 34.873	+ 4.1122	— 70 56 39.17	— 19.478
* ε Virginis . . .	2.7	12 56 36.127	2.9880	+ 11 33 40.46	19.419
θ Virginis . . .	4.3	13 4 9.047	3.1010	— 4 56 27.29	19.314
* 20 Canum Venaticorum . . .	4.7	13 12 31.205	2.6970	+ 41 9 44.57	19.038
α Urs. Min. ( <i>Polaris</i> ) S. P.	2.0	13 17 44.827	+ 22.9790	+ 91 17 19.40	— 18.910

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MEAN PLACES FOR 1888.0. (January 0 <sup>d</sup> .196, Washington.)								
Name of Star.		Magni- tude.	Right Ascension.		Annual Variation.	Declination.	Annual Variation.	
			<sup>h</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	
<i>a</i> Virginis ( <i>Spica</i> )		1.0	13	19	17.558	+ 3.1535	— 10° 34' 35.56	— 18.903
38	Cassiopeæ S. P.	6.3	13	22	54.174	4.3757	+ 110 18 44.08	18.680
*	<i>κ</i> Octantis	5.0	13	22	58.154	8.7229	— 85 12 40.12	18.755
ζ	Virginis	3.3	13	28	59.169	3.0530	— 0 1 22.88	18.521
*	B. A. C. 4536	5.0	13	29	47.703	2.6824	+ 37 45 22.89	18.542
<i>m</i> Virginis		6.0	13	35	44.031	+ 3.1429	— 8 8 15.13	— 18.293
η	Ursæ Majoris	2.0	13	43	7.668	2.3714	+ 49 52 20.61	18.082
η	Bootis	3.0	13	49	21.124	2.8567	+ 18 57 33.99	18.174
50	Cassiopeæ S. P.	4.0	13	53	52.821	5.0085	+ 108 7 16.39	17.651
*	θ Apodis	5.0	13	54	26.490	5.6704	— 76 15 18.31	17.600
β Centauri		1.0	13	55	55.297	+ 4.1765	— 59 49 56.13	— 17.595
*	π Hydræ	3.7	13	59	59.607	3.4005	— 26 8 30.65	17.368
α Draconis		3.3	14	1	21.483	1.6237	+ 64 54 40.31	17.301
*	d Bootis	5.0	14	5	17.495	2.7388	+ 25 37 20.90	17.204
*	κ Virginis	4.3	14	6	55.300	3.1938	— 9 45 7.57	16.933
δ Octantis		5.0	14	9	3.399	+ 8.9626	— 83 9 12.14	— 16.965
*	4 Ursæ Minoris	5.0	14	9	17.670	— 0.3349	+ 78 4 25.86	16.909
α Bootis ( <i>Arcturus</i> )		1.0	14	10	33.184	+ 2.7349	+ 19 45 56.87	18.887
*	λ Bootis	4.0	14	12	7.543	2.2830	+ 46 36 10.14	16.663
*	λ Virginis	4.7	14	13	2.992	3.2378	— 12 51 18.66	16.734
ι Cassiopeæ S. P.		4.0	14	19	50.427	+ 4.8603	+ 113 6 6.67	— 16.439
θ Bootis		4.0	14	21	23.096	2.0442	+ 52 22 7.03	16.765
ρ Bootis		3.7	14	27	0.249	+ 2.5877	+ 30 51 47.90	15.695
5 Ursæ Minoris		4.7	14	27	46.180	— 0.1919	+ 76 11 37.87	16.011
α <sup>2</sup> Centauri		1.0	14	32	0.953	+ 4.0450	— 60 22 31.86	15.381
*	α Apodis	4.7	14	33	59.295	+ 7.1877	— 78 34 5.91	— 15.695
*	μ Hydri S. P.	6.0	14	34	3.414	— 1.4579	— 100 24 8.40	15.680
*	33 Bootis	5.3	14	34	40.139	+ 2.2344	+ 44 53 16.85	15.715
ε Bootis		2.3	14	40	5.800	2.6213	+ 27 32 48.13	15.346
α <sup>2</sup> Libræ		2.3	14	44	40.944	3.3093	— 15 34 33.19	15.174
47 Cephei (H.) S. P.		6.0	14	51	13.390	+ 7.7152	+ 101 1 31.21	— 14.708
β Ursæ Minoris		2.0	14	51	2.289	— 0.2325	+ 74 36 47.49	14.719
*	γ Scorpii	3.3	14	57	30.987	+ 3.5018	— 24 50 27.98	14.362
β Bootis		3.0	14	57	43.657	2.2601	+ 40 49 57.32	14.365
48 Cephei (H.) S. P.		6.3	15	6	7.888	7.4018	+ 102 40 41.49	13.743
β Libræ		2.0	15	10	58.810	+ 3.2216	— 8 58 8.99	— 13.515
*	δ Bootis	3.0	15	10	59.284	2.4208	+ 33 43 59.39	13.589
*	ρ Octantis	6.0	15	17	34.930	12.9580	— 84 5 21.10	13.003
μ <sup>1</sup> Bootis		4.0	15	20	15.585	+ 2.2662	+ 37 46 13.31	12.784
γ <sup>2</sup> Ursæ Minoris		3.0	15	20	54.679	— 0.1347	+ 72 13 57.08	12.811
β Coronæ Borealis		4.0	15	23	12.707	+ 2.4750	+ 29 29 31.31	— 12.600
α Coronæ Borealis		2.0	15	29	56.777	2.5393	+ 27 5 31.26	12.311
*	γ Camelop. (H.) S. P.	4.3	15	38	32.646	6.2351	+ 109 0 51.08	11.556
α Serpentis		2.3	15	38	45.083	2.9515	+ 6 46 42.33	11.558
ε Serpentis		3.3	15	45	13.995	+ 2.9870	+ 4 48 55.59	11.056
ζ Ursæ Minoris		4.3	15	48	4.446	— 2.2543	+ 78 8 19.07	— 10.917
ε Coronæ Borealis		4.0	15	52	57.109	+ 2.4832	+ 27 12 9.46	10.617
δ Scorpii		2.3	15	53	42.686	3.5385	— 22 18 7.97	10.536
β <sup>1</sup> Scorpii		2.0	15	58	55.510	3.4806	— 19 29 53.63	10.146
*	δ <sup>1</sup> Apodis	5.3	16	3	38.187	+ 8.7695	— 78 24 41.16	— 9.750

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MEAN PLACES FOR 1888.0. (January 0<sup>d</sup>.196, Washington.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>''</sup>
• $\varphi$ Herculis . . .	4.0	16 5 14.271	+ 1.8811	+ 45 13 43.92	— 9.585
Groombridge 2320 . .	6.3	16 6 0.904	0.1392	+ 68 6 19.13	9.499
• $\delta$ Ophiuchi . . .	3.0	16 8 28.584	3.1395	— 3 24 19.10	9.521
• $\epsilon$ Coronæ Borealis ( <i>mean</i> )	5.7	16 10 29.003	2.2445	+ 34 8 34.67	9.263
• $\gamma$ Apodis . . .	4.3	16 16 18.090	9.0593	— 78 38 37.66	8.767
$\tau$ Herculis . . .	3.3	16 16 22.486	+ 1.8010	+ 46 34 48.99	— 8.739
• $\eta$ Ursæ Minoris . .	5.0	16 20 47.104	— 1.8180	+ 76 0 47.29	8.159
$\eta$ Draconis . . .	2.7	16 22 28.642	+ 0.8061	+ 61 46 4.12	8.224
$\alpha$ Scorpii ( <i>Antares</i> ) .	1.3	16 22 32.426	3.6700	— 26 10 57.62	8.310
$\beta$ Herculis . . .	2.3	16 25 24.321	+ 2.5774	+ 21 44 3.11	8.063
A Draconis . . .	5.0	16 28 12.446	— 0.1355	+ 69 0 36.93	— 7.798
$\zeta$ Ophiuchi . . .	2.7	16 30 59.505	+ 3.2990	— 10 20 22.38	7.572
$\alpha$ Trianguli Australis .	2.0	16 36 48.770	6.3024	— 68 49 13.34	7.170
$\eta$ Herculis . . .	3.3	16 39 3.357	2.0537	+ 39 8 8.32	7.027
$\alpha$ Camelopardalis S. P.	4.7	16 42 54.966	5.9240	+ 113 50 56.56	6.617
$\kappa$ Ophiuchi . . .	3.3	16 52 22.030	+ 2.8374	+ 9 32 59.22	— 5.838
$d$ Herculis . . .	5.0	16 57 28.262	+ 2.2112	+ 33 43 51.27	5.402
$\epsilon$ Ursæ Minoris . .	4.3	16 57 28.276	— 6.3360	+ 82 13 12.96	5.406
• $\eta$ Ophiuchi . . .	2.7	17 3 57.272	+ 3.4369	— 15 35 7.65	4.745
$\alpha^1$ Herculis ( <i>var.</i> ) .	3.5	17 9 32.438	2.7334	+ 14 31 6.84	4.353
• $\pi$ Herculis . . .	3.0	17 11 8.794	+ 2.0889	+ 36 56 8.74	— 4.234
• $\theta$ Ophiuchi . . .	3.3	17 15 7.862	3.6789	— 24 53 13.01	3.953
$b$ Ophiuchi ( <i>var.</i> ) .	5.0	17 19 31.823	3.6589	— 24 4 16.99	3.654
• $\delta$ Aræ . . .	4.0	17 20 59.499	5.4011	— 60 35 21.35	3.539
Groombr. 966 . . S. P.	6.3	17 24 45.555	7.9996	+ 105 1 56.44	3.091
• Groombr. 944 . . S. P.	6.3	17 26 11.048	+ 18.6430	+ 94 51 43.33	— 2.960
$\beta$ Draconis . . .	2.7	17 27 54.164	1.3533	+ 52 23 4.01	2.800
$\alpha$ Ophiuchi . . .	2.0	17 29 44.133	2.7829	+ 12 38 31.69	2.877
• $\epsilon$ Herculis . . .	3.3	17 36 18.306	+ 1.6964	+ 46 3 58.32	2.071
$\omega$ Draconis . . .	5.0	17 37 36.510	— 0.3540	+ 68 48 34.56	1.632
$\mu$ Herculis . . .	3.3	17 42 4.546	+ 2.3463	+ 27 47 11.64	— 2.327
$\phi^1$ Draconis . . .	4.3	17 43 55.836	— 1.0794	+ 72 12 12.56	1.678
• $\theta$ Herculis . . .	4.0	17 52 24.699	+ 2.0550	+ 37 15 56.73	0.644
$\gamma$ Draconis . . .	2.3	17 54 0.331	1.3915	+ 51 30 8.07	0.554
$\gamma^3$ Sagittarii . . .	3.3	17 58 36.784	3.8515	— 30 25 28.43	— 0.340
• $\epsilon$ Herculis . . .	4.0	18 3 10.427	+ 2.3393	+ 28 44 51.02	+ 0.267
22 Camelop. (H.) . S. P.	4.7	18 6 29.968	6.6175	+ 110 38 33.03	0.687
$\mu^1$ Sagittarii . . .	4.0	18 7 3.924	+ 3.5866	— 21 5 14.16	0.606
$\delta$ Ursæ Minoris . .	4.3	18 8 26.569	— 19.4620	+ 86 36 20.24	0.790
$\eta$ Serpentis . . .	3.0	18 15 30.871	+ 3.1023	— 2 55 37.02	0.682
• $\lambda$ Sagittarii . . .	3.0	18 21 3.514	+ 3.7027	— 25 28 58.05	+ 1.629
• $\chi$ Draconis . . .	4.0	18 23 4.495	— 1.0794	+ 72 41 2.19	1.640
$\iota$ Aquilæ . . .	4.3	18 29 6.743	+ 3.2645	— 8 19 18.27	2.210
• $\zeta$ Pavonis . . .	4.0	18 29 56.621	7.0300	— 71 31 18.35	2.471
$\alpha$ Lyræ ( <i>Vega</i> ) . .	1.0	18 33 8.803	2.0313	+ 38 40 47.03	3.163
$\sigma$ Octantis . . .	6.0	18 38 50.637	+ 106.5070	— 89 16 8.18	+ 3.364
$\beta$ Lyræ ( <i>var.</i> ) . .	4.0	18 45 56.709	2.2142	+ 33 13 58.63	3.976
51 Cephei (H.) . . S. P.	5.3	18 47 45.601	29.9400	+ 92 46 47.16	4.241
$\sigma$ Sagittarii . . .	2.3	18 48 19.226	+ 3.7217	— 26 26 5.92	4.119
50 Draconis . . .	6.0	18 49 58.873	— 1.9072	+ 75 18 5.27	+ 4.414

\* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.



MEAN PLACES FOR 1888.0. (January 0 <sup>d</sup> .196, Washington.)					
Name of Star.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
* $\gamma$ Lyræ . . . .	3.3	<sup>h</sup> 18 <sup>m</sup> 54 <sup>s</sup> 45.257	+ 2.2443	+ 32° 32' 10".94	+ 4".756
$\zeta$ Aquilæ . . . .	3.0	19 0 15.751	2.7569	+ 13 41 51.10	5.109
* $\epsilon$ Lyræ . . . .	5.0	19 3 18.343	2.1411	+ 35 55 30.00	5.478
* 25 Camelopardalis S. P.	4.7	19 7 28.728	12.9660	+ 97 22 31.82	5.850
$\delta$ Sagittarii . . .	5.0	19 11 4.901	3.5123	— 19 9 5.17	6.102
* $\theta$ Lyræ . . . .	4.3	19 12 30.791	+ 2.0789	+ 37 56 4.24	+ 6.238
$\delta$ Draconis . . . .	3.0	19 12 31.680	+ 0.0299	+ 67 27 52.29	6.326
$\tau$ Draconis . . . .	4.7	19 17 42.254	— 1.1162	+ 73 8 50.30	6.778
Piazzii vii. 67 . . S. P.	6.0	19 19 13.391	+ 6.2999	+ 111 18 24.99	6.832
$\delta$ Aquilæ . . . .	3.3	19 19 51.078	3.0253	+ 2 53 31.44	6.923
* $\beta$ Cygni . . . .	3.0	19 26 12.284	+ 2.4193	+ 27 43 29.46	+ 7.358
$\kappa$ Aquilæ . . . .	5.0	19 30 51.946	3.2289	— 7 16 32.76	7.744
* $\beta$ Sagittæ . . . .	4.3	19 36 1.125	+ 2.6955	+ 17 13 0.83	8.130
$\lambda$ Ursæ Minoris . .	6.3	19 35 44.175	— 64.4780	+ 88 57 44.44	8.145
$\gamma$ Aquilæ . . . .	3.0	19 40 56.105	+ 2.8522	+ 10 20 27.01	8.541
* $\delta$ Cygni . . . .	2.7	19 41 28.497	+ 1.8761	+ 44 51 27.46	+ 8.628
$\alpha$ Aquilæ ( <i>Allair</i> ) . .	1.3	19 45 19.132	2.9276	+ 8 34 22.87	9.265
* Groombr. 1374 . . S. P.	5.7	19 46 46.422	7.2885	+ 105 47 4.13	9.042
* $\epsilon$ Pavonis . . . .	4.0	19 47 37.240	+ 7.0221	— 73 12 14.38	9.074
$\epsilon$ Draconis . . . .	3.7	19 48 32.813	— 0.1786	+ 69 58 57.66	9.174
$\beta$ Aquilæ . . . .	4.0	19 49 48.707	+ 2.9471	+ 6 7 38.98	+ 8.754
* $\gamma$ Sagittæ . . . .	3.7	19 53 46.587	2.6678	+ 19 11 18.50	9.589
* $c$ Sagittarii . . .	5.0	19 55 46.174	3.6952	— 28 1 13.66	9.725
$\tau$ Aquilæ . . . .	6.0	19 58 40.164	2.9331	+ 6 57 44.39	9.933
3 Ursæ Majoris (H.) S. P.	5.7	20 1 39.733	6.0507	+ 111 11 51.11	10.150
* $\theta$ Aquilæ . . . .	3.0	20 5 31.526	+ 3.0974	— 1 9 11.61	+ 10.451
* 31 Cygni . . . .	4.3	20 10 6.306	1.8893	+ 46 24 6.76	10.786
$\alpha^2$ Capricorni . . .	3.0	20 11 50.417	+ 3.3323	— 12 53 28.94	10.910
$\kappa$ Cephei ( <i>pr.</i> ) . . .	4.3	20 12 38.803	— 1.9208	+ 77 22 25.60	10.998
$\alpha$ Pavonis . . . .	2.0	20 16 47.411	+ 4.7849	— 57 5 34.27	11.180
$\gamma$ Cygni . . . .	2.3	20 18 12.630	+ 2.1537	+ 39 53 54.43	+ 11.320
$\pi$ Capricorni . . . .	5.0	20 20 54.633	3.4398	— 18 34 41.85	11.550
$\epsilon$ Delphini . . . .	4.0	20 27 51.757	+ 2.8672	+ 10 55 23.36	12.037
Groombridge 3241 . .	6.3	20 30 29.100	— 0.2189	+ 72 9 7.90	12.221
* $\alpha$ Delphini . . . .	3.0	20 34 26.150	+ 2.7878	+ 15 31 2.31	12.514
* $\beta$ Pavonis . . . .	3.7	20 34 51.503	+ 5.4757	— 66 36 15.74	+ 12.520
$\alpha$ Cygni . . . .	1.7	20 37 36.850	2.0444	+ 44 52 49.15	12.721
* $\psi$ Capricorni . . .	4.3	20 39 27.720	3.5588	— 25 40 22.12	12.683
* $\epsilon$ Cygni . . . .	2.7	20 41 40.783	2.4274	+ 33 33 3.38	13.335
$\mu$ Aquarii . . . .	4.7	20 46 36.775	+ 3.2399	— 9 24 11.24	13.284
12 Year Cat. 1879 . .	6.0	20 52 38.746	— 2.5446	+ 80 7 54.48	+ 13.687
$\nu$ Cygni . . . .	4.0	20 52 59.866	+ 2.2341	+ 40 44 10.38	13.721
$\sigma^2$ Ursæ Majoris . . S. P.	5.0	21 0 31.802	5.3567	+ 112 24 41.69	14.268
61 <sup>1</sup> Cygni . . . .	5.0	21 1 52.596	2.6832	+ 38 11 56.07	17.527
$\zeta$ Cygni . . . .	3.0	21 8 10.146	2.5496	+ 29 46 3.92	14.606
* $\tau$ Cygni . . . .	4.0	21 10 19.243	+ 2.3932	+ 37 34 3.22	+ 15.259
$\alpha$ Cephei . . . .	2.7	21 15 54.383	1.4366	+ 62 6 40.11	15.171
1 Pegasi . . . .	4.3	21 16 54.388	2.7722	+ 19 19 32.22	15.237
* $\zeta$ Capricorni . . .	4.3	21 20 16.269	3.4329	— 22 53 45.38	15.396
1 Draconis (H.) . . S. P.	4.0	21 21 3.761	+ 9.0105	+ 98 10 47.17	+ 15.439

\* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

MEAN PLACES FOR 1888.0. (January 0<sup>d</sup>.196, Washington.)

Name of Star.		Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
<i>d</i> Ursæ Majoris . . . . .	S. P.	4.7	<sup>h</sup> 21 <sup>m</sup> 24 <sup>s</sup> 33.920	+ 5.4032	+ 109° 40' 41".56	+ 15.555
<i>β</i> Aquarii . . . . .		3.0	21 25 39.776	3.1618	— 6 3 48.75	15.659
<i>β</i> Cephei ( <i>pr.</i> ) . . . . .		3.0	21 27 12.716	0.7946	+ 70 4 8.57	15.755
<i>ε</i> Aquarii . . . . .		5.0	21 31 47.396	2.1960	— 8 21 22.03	15.968
* 74 Cygni . . . . .		5.0	21 32 27.608	2.4014	+ 39 54 37.54	16.049
* <sup>λ</sup> Octantis . . . . .		5.3	21 33 38.684	+ 9.8038	— 83 13 58.20	+ 16.022
* ζ Chamælonitis . . . . .	S. P.	5.0	21 37 9.497	— 1.5582	— 99 33 43.60	16.289
<i>ε</i> Pegasi . . . . .		2.3	21 38 41.132	+ 2.9467	+ 9 21 42.55	16.354
11 Cephei . . . . .		5.0	21 40 16.830	0.9018	+ 70 47 44.97	16.538
* <sup>π</sup> Cygni . . . . .		4.3	21 42 39.354	2.2129	+ 48 47 29.66	16.541
<i>μ</i> Capricorni . . . . .		5.0	21 47 11.376	+ 3.2762	— 14 4 43.14	+ 16.777
* 16 Pegasi . . . . .		5.3	21 47 57.965	2.7278	+ 25 23 54.28	16.816
79 Draconis . . . . .		6.3	21 51 28.178	0.7298	+ 73 10 21.03	17.013
<i>α</i> Aquarii . . . . .		3.0	22 0 1.882	3.0828	— 0 51 49.26	17.354
<i>α</i> Gruis . . . . .		2.0	22 1 10.278	3.8067	— 47 30 10.20	17.245
* <i>π</i> Pegasi . . . . .		4.0	22 5 0.816	+ 2.6599	+ 32 37 44.19	+ 17.578
* <i>υ</i> Octantis . . . . .		6.0	22 9 58.548	13.2276	— 86 32 7.91	17.873
32 Ursæ Majoris . . . . .	S. P.	6.0	22 9 53.604	4.4224	+ 114 20 0.66	17.809
<i>θ</i> Aquarii . . . . .		4.3	22 10 55.412	3.1693	— 8 20 26.57	17.800
* <i>γ</i> Aquarii . . . . .		3.3	22 15 52.259	3.1010	— 1 57 5.42	18.038
<i>π</i> Aquarii . . . . .		4.7	22 19 33.448	+ 3.0647	+ 0 48 33.47	+ 18.153
* <i>σ</i> Aquarii . . . . .		5.0	22 24 43.101	3.1759	— 11 15 2.94	18.316
9 Draconis . . . . .	S. P.	4.7	22 25 33.737	5.2668	+ 103 42 38.10	18.390
* <i>α</i> Lacertæ . . . . .		4.0	22 26 40.649	2.4620	+ 49 42 24.35	18.413
<i>γ</i> Aquarii . . . . .		4.0	22 29 36.064	3.0837	— 0 41 40.42	18.456
226 Cephei (B.) . . . . .		5.3	22 30 18.381	+ 1.0779	+ 75 38 57.31	+ 18.528
* 10 Lacertæ . . . . .		5.0	22 34 14.162	2.6863	+ 38 28 2.91	18.668
* <i>β</i> Octantis . . . . .		4.7	22 34 33.510	6.4940	— 81 58 4.69	18.677
* ζ Pegasi . . . . .		3.3	22 35 52.585	2.9909	+ 10 14 48.80	18.704
* <i>λ</i> Pegasi . . . . .		4.0	22 41 8.188	2.8849	+ 22 58 35.09	18.872
<i>ε</i> Cephei . . . . .		3.3	22 45 41.558	+ 2.1215	+ 65 36 40.90	+ 18.876
<i>λ</i> Aquarii . . . . .		4.0	22 46 46.305	3.1329	— 8 10 31.25	19.073
* Groombr. 1706 . . . . .	S. P.	6.0	22 50 58.401	4.9744	+ 101 37 48.17	19.178
<i>α</i> Pis. Aus. ( <i>Fomalhaut</i> ) . . . . .		1.3	22 51 27.632	3.3252	— 30 12 56.30	18.992
* <i>ο</i> Andromedæ . . . . .		3.7	22 56 46.097	2.7496	+ 41 43 26.43	19.286
<i>α</i> Ursæ Majoris . . . . .	S. P.	2.0	22 56 48.644	+ 3.7486	+ 117 38 40.28	+ 19.362
<i>α</i> Pegasi ( <i>Markab</i> ) . . . . .		2.0	22 59 10.925	2.9849	+ 14 36 9.82	19.301
* <i>φ</i> Aquarii . . . . .		4.3	23 8 31.341	3.1090	— 6 39 9.36	19.358
* <i>ο</i> Cephei . . . . .		5.3	23 14 1.779	2.4434	+ 67 29 55.89	19.669
* <i>τ</i> Pegasi . . . . .		4.7	23 15 5.616	2.9634	+ 23 7 38.06	19.655
<i>θ</i> Piscium . . . . .		4.7	23 22 17.199	+ 3.0411	+ 5 45 49.40	+ 19.726
<i>λ</i> Draconis . . . . .	S. P.	3.3	23 24 44.754	3.6230	+ 110 3 3.18	19.837
* <i>λ</i> Andromedæ . . . . .		4.0	23 32 5.022	2.9216	+ 45 51 4.05	19.470
<i>ε</i> Piscium . . . . .		4.3	23 34 11.386	3.0841	+ 5 1 9.43	19.483
<i>γ</i> Cephei . . . . .		3.3	23 34 45.135	2.4143	+ 77 0 25.82	20.075
* <sup>δ</sup> 1 Aquarii . . . . .		5.0	23 38 23.566	+ 3.1170	— 18 53 54.37	+ 19.957
* <i>δ</i> Sculptoris . . . . .		4.3	23 43 5.513	3.1327	— 28 44 57.63	19.855
* <sup>γ</sup> 1 Octantis . . . . .		5.3	23 45 29.982	3.6946	— 82 38 28.57	19.991
Groombridge 4163 . . . . .		7.0	23 49 23.481	2.8638	+ 73 47 13.32	20.023
* <i>ω</i> Piscium . . . . .		4.0	23 53 33.615	3.0783	+ 6 14 35.56	19.931
* 33 Piscium . . . . .		5.0	23 59 36.169	+ 3.0709	— 6 20 2.62	+ 20.144

\* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Jan.	<sup>h</sup> <sup>m</sup> 1 17	+88° 42'	Jan.	<sup>h</sup> <sup>m</sup> 6 48	+87° 13'	Jan.	<sup>h</sup> <sup>m</sup> 18 8	+86° 36'	Jan.	<sup>h</sup> <sup>m</sup> 19 34	+88° 57'
0.3	<sup>s</sup> 68.49	53.7	0.5	<sup>s</sup> 4.24	6.5	1.0	<sup>s</sup> 8.89	43.8	1.0	<sup>s</sup> 56.96	53.4
1.3	67.44	53.8	1.5	4.37	6.8	2.0	8.89	43.4	2.0	56.44	53.0
2.3	66.37	53.9	2.5	4.46	7.1	3.0	8.92	43.0	3.0	56.00	52.6
3.3	65.31	54.0	3.5	4.52	7.5	4.0	8.97	42.7	4.0	55.64	52.3
4.3	64.28	54.1	4.5	4.56	7.8	5.0	9.02	42.3	5.0	55.32	52.0
5.3	63.29	54.2	5.5	4.59	8.1	6.0	9.08	42.0	6.0	55.03	51.6
6.3	62.36	54.2	6.5	4.61	8.5	7.0	9.13	41.7	7.0	54.76	51.3
7.3	61.48	54.3	7.5	4.64	8.8	8.0	9.18	41.4	8.0	54.48	51.0
8.3	60.63	54.3	8.5	4.69	9.1	9.0	9.22	41.1	9.0	54.16	50.6
9.3	59.77	54.4	9.5	4.76	9.4	9.9	9.25	40.7	10.0	53.81	50.5
10.2	58.90	54.5	10.5	4.83	9.8	10.9	9.28	40.4	11.0	53.43	50.2
11.2	58.00	54.5	11.5	4.90	10.1	11.9	9.31	40.1	12.0	53.05	49.9
12.2	57.04	54.6	12.5	4.96	10.4	12.9	9.36	39.7	13.0	52.68	49.5
13.2	56.02	54.7	13.5	5.01	10.8	13.9	9.44	39.4	14.0	52.37	49.2
14.2	54.95	54.7	14.5	5.03	11.1	14.9	9.53	39.0	15.0	52.13	48.8
15.2	53.85	54.8	15.5	5.01	11.4	15.9	9.63	38.6	16.0	51.98	48.4
16.2	52.74	54.8	16.5	4.96	11.7	16.9	9.77	38.2	17.0	51.92	48.0
17.2	51.65	54.8	17.5	4.88	12.1	17.9	9.93	37.9	18.0	51.94	47.7
18.2	50.60	54.7	18.5	4.78	12.4	18.9	10.09	37.6	19.0	52.01	47.3
19.2	49.60	54.7	19.5	4.66	12.7	19.9	10.26	37.3	20.0	52.10	47.0
20.2	48.65	54.6	20.4	4.54	13.0	20.9	10.42	37.0	21.0	52.19	46.7
21.2	47.73	54.6	21.4	4.43	13.4	21.9	10.57	36.7	22.0	52.26	46.4
22.2	46.86	54.5	22.4	4.34	13.7	22.9	10.71	36.4	23.0	52.30	46.1
23.2	46.00	54.5	23.4	4.27	14.0	23.9	10.84	36.1	24.0	52.28	45.8
24.2	45.12	54.5	24.4	4.21	14.3	24.9	10.97	35.8	25.0	52.25	45.5
25.2	44.20	54.5	25.4	4.15	14.6	25.9	11.11	35.5	26.0	52.22	45.2
26.2	43.23	54.4	26.4	4.07	14.9	26.9	11.26	35.2	27.0	52.21	44.8
27.2	42.31	54.4	27.4	3.98	15.3	27.9	11.42	34.9	28.0	52.25	44.5
28.2	41.16	54.4	28.4	3.87	15.6	28.9	11.61	34.5	29.0	52.36	44.1
29.2	40.09	54.3	29.4	3.73	15.9	29.9	11.82	34.2	30.0	52.54	43.7
30.2	39.02	54.2	30.4	3.55	16.2	30.9	12.04	33.9	31.0	52.81	43.4
31.2	37.98	54.1	31.4	3.35	16.5	31.9	12.27	33.6			

## CIRCUMPOLAR STARS.

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Feb.	<sup>h</sup> 1 <sup>m</sup> 17	+88° 42'	Feb.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 13'	Feb.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	Feb.	<sup>h</sup> 19 <sup>m</sup> 34	+88° 57'
	<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"
1.3	36.99	54.0	1.4	63.13	16.8	1.9	12.51	33.3	1.0	53.14	43.0
2.2	36.07	53.9	2.4	62.91	17.1	2.9	12.76	33.1	1.9	53.50	42.7
3.2	35.21	53.8	3.4	62.70	17.4	3.9	13.00	32.9	2.9	53.89	42.4
4.2	34.40	53.6	4.4	62.50	17.7	4.9	13.22	32.6	3.9	54.27	42.1
5.2	33.61	53.5	5.4	62.31	17.9	5.9	13.43	32.4	4.9	54.61	41.8
6.2	32.82	53.4	6.4	62.14	18.2	6.9	13.64	32.2	5.9	54.93	41.5
7.2	32.01	53.3	7.4	61.98	18.5	7.9	13.85	31.9	6.9	55.22	41.2
8.2	31.17	53.2	8.4	61.82	18.8	8.9	14.06	31.7	7.9	55.49	40.9
9.2	30.28	53.1	9.4	61.64	19.0	9.9	14.29	31.4	8.9	55.76	40.6
10.2	29.34	53.0	10.4	61.44	19.3	10.9	14.55	31.1	9.9	56.07	40.3
11.2	28.37	52.9	11.4	61.20	19.6	11.9	14.83	30.8	10.9	56.46	40.0
12.2	27.39	52.8	12.4	60.92	19.9	12.9	15.13	30.5	11.9	56.92	39.6
13.2	26.43	52.6	13.4	60.62	20.1	13.9	15.44	30.3	12.9	57.45	39.3
14.2	25.51	52.4	14.4	60.30	20.4	14.9	15.76	30.1	13.9	58.08	39.0
15.1	24.65	52.2	15.4	59.96	20.6	15.9	16.09	29.9	14.9	58.77	38.7
16.1	23.85	51.9	16.4	59.62	20.9	16.8	16.41	29.7	15.0	59.48	38.4
17.1	23.10	51.7	17.4	59.29	21.1	17.8	16.72	29.5	16.9	60.20	38.1
18.1	22.40	51.5	18.4	58.97	21.4	18.8	17.02	29.4	17.9	60.91	37.8
19.1	21.73	51.3	19.4	58.66	21.6	19.8	17.31	29.2	18.9	61.58	37.6
20.1	21.06	51.1	20.4	58.38	21.8	20.8	17.59	29.0	19.9	62.21	37.3
21.1	20.37	50.9	21.4	58.11	22.0	21.8	17.87	28.8	20.9	62.81	37.1
22.1	19.65	50.8	22.4	57.84	22.3	22.8	18.16	28.6	21.9	63.37	36.8
23.1	18.89	50.6	23.4	57.55	22.5	23.8	18.46	28.4	22.9	63.95	36.6
24.1	18.09	50.4	24.3	57.24	22.7	24.8	18.77	28.2	23.9	64.56	36.3
25.1	17.27	50.2	25.3	56.91	22.9	25.8	19.09	28.0	24.9	65.23	36.0
26.1	16.45	50.0	26.3	56.55	23.1	26.8	19.44	27.8	25.9	65.96	35.7
27.1	15.66	49.7	27.3	56.16	23.3	27.8	19.80	27.6	26.9	66.78	35.4
28.1	14.93	49.5	28.3	55.76	23.5	28.8	20.17	27.5	27.9	67.65	35.2
29.1	14.27	49.2	29.3	55.36	23.7	29.8	20.53	27.4	28.9	68.57	34.9
									29.9	69.50	34.7

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Mar.	<sup>h</sup> 1 <sup>m</sup> 17	+88° 42'	Mar.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 13'	Mar.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	Mar.	<sup>h</sup> 19 <sup>m</sup> 35	+88° 57'
1.1	<sup>s</sup> 13.68	48.9	1.3	<sup>s</sup> 54.97	23.8	1.8	<sup>s</sup> 20.89	27.3	1.9	<sup>s</sup> 10.44	34.5
2.1	13.16	48.6	2.3	54.59	24.0	2.8	21.23	27.2	2.9	11.35	34.3
3.1	12.68	48.4	3.3	54.22	24.2	3.8	21.56	27.1	3.9	12.22	34.1
4.1	12.21	48.1	4.3	53.87	24.3	4.8	21.88	27.0	4.9	13.04	33.9
5.1	11.73	47.9	5.3	53.54	24.5	5.8	22.19	26.9	5.9	13.83	33.7
6.1	11.24	47.7	6.3	53.21	24.7	6.8	22.50	26.8	6.9	14.61	33.5
7.1	10.72	47.5	7.3	52.88	24.8	7.8	22.82	26.7	7.9	15.41	33.3
8.1	10.16	47.2	8.3	52.53	24.9	8.8	23.16	26.6	8.9	16.25	33.1
9.1	9.56	47.0	9.3	52.16	25.1	9.8	23.52	26.4	9.8	17.15	32.9
10.1	8.94	46.7	10.3	51.76	25.2	10.8	23.90	26.3	10.8	18.14	32.7
11.1	8.33	46.4	11.3	51.33	25.4	11.8	24.29	26.2	11.8	19.19	32.4
12.1	7.76	46.1	12.3	50.87	25.5	12.8	24.69	26.2	12.8	20.32	32.2
13.1	7.25	45.8	13.3	50.40	25.7	13.8	25.09	26.1	13.8	21.48	32.1
14.1	6.82	45.5	14.3	49.93	25.8	14.8	25.48	26.1	14.8	22.64	31.9
15.1	6.46	45.2	15.3	49.46	25.8	15.8	25.86	26.1	15.8	23.78	31.8
16.1	6.15	44.8	16.3	49.01	25.9	16.8	26.23	26.1	16.8	24.88	31.6
17.1	5.89	44.5	17.3	48.58	25.9	17.8	26.58	26.1	17.8	25.93	31.5
18.1	5.64	44.2	18.3	48.18	26.0	18.8	26.93	26.1	18.8	26.93	31.4
19.1	5.38	44.0	19.3	47.80	26.0	19.8	27.26	26.1	19.8	27.89	31.3
20.1	5.10	43.7	20.3	47.43	26.1	20.8	27.59	26.1	20.8	28.84	31.2
21.1	4.79	43.4	21.3	47.05	26.2	21.8	27.92	26.0	21.8	29.81	31.0
22.0	4.44	43.2	22.3	46.66	26.3	22.7	28.27	26.0	22.8	30.81	30.9
23.0	4.07	42.9	23.3	46.24	26.4	23.7	28.64	25.9	23.8	31.87	30.8
24.0	3.70	42.6	24.3	45.80	26.5	24.7	29.02	25.9	24.8	32.99	30.6
25.0	3.36	42.3	25.3	45.35	26.5	25.7	29.41	25.9	25.8	34.16	30.5
26.0	3.06	41.9	26.3	44.88	26.6	26.7	29.80	25.9	26.8	35.38	30.4
27.0	2.82	41.6	27.3	44.40	26.6	27.7	30.18	26.0	27.8	36.62	30.3
28.0	2.66	41.3	28.3	43.94	26.6	28.7	30.56	26.1	28.8	37.84	30.2
29.0	2.58	40.9	29.3	43.49	26.6	29.7	30.93	26.1	29.8	39.02	30.2
30.0	2.55	40.6	30.3	43.06	26.6	30.7	31.28	26.2	30.8	40.16	30.1
31.0	2.56	40.3	31.3	42.66	26.5	31.7	31.61	26.3	31.8	41.26	30.1
32.0	2.57	40.0	32.2	42.27	26.5	32.7	31.93	26.4	32.8	42.31	30.1

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascension.	Declina- tion North.		Right Ascension.	Declina- tion North.		Right Ascension.	Declina- tion North.		Right Ascension.	Declina- tion North.
Apr.	<sup>h</sup> 1 <sup>m</sup> 17	+88° 42'	Apr.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 13'	Apr.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	Apr.	<sup>h</sup> 19 <sup>m</sup> 35	+88° 57'
1.0	<sup>s</sup> 2.57	40.0	1.2	<sup>s</sup> 42.27	26.5	1.7	<sup>s</sup> 31.93	26.4	1.8	<sup>s</sup> 42.31	30.1
2.0	2.56	39.7	2.2	41.90	26.5	2.7	32.24	26.5	2.8	43.32	30.1
3.0	2.52	39.4	3.2	41.53	26.5	3.7	32.56	26.5	3.8	44.32	30.0
4.0	2.45	39.2	4.2	41.16	26.4	4.7	32.89	26.6	4.8	45.34	29.9
5.0	2.35	38.9	5.2	40.77	26.4	5.7	33.23	26.6	5.8	46.42	29.9
6.0	2.23	38.6	6.2	40.35	26.5	6.7	33.58	26.7	6.8	47.56	29.8
7.0	2.12	38.3	7.2	39.91	26.5	7.7	33.95	26.7	7.8	48.75	29.8
8.0	2.03	37.9	8.2	39.45	26.4	8.7	34.32	26.8	8.8	50.00	29.7
9.0	1.99	37.6	9.2	38.98	26.4	9.7	34.70	26.9	9.8	51.29	29.7
10.0	2.02	37.2	10.2	38.50	26.3	10.7	35.07	27.1	10.8	52.59	29.7
11.0	2.12	36.9	11.2	38.02	26.3	11.7	35.43	27.2	11.8	53.86	29.7
12.0	2.29	36.6	12.2	37.57	26.2	12.7	35.77	27.4	12.8	55.09	29.8
13.0	2.50	36.2	13.2	37.15	26.1	13.7	36.09	27.6	13.8	56.26	29.8
14.0	2.74	35.9	14.2	36.75	25.9	14.7	36.39	27.7	14.8	57.37	29.9
15.0	2.99	35.6	15.2	36.38	25.8	15.7	36.67	27.9	15.7	58.41	29.9
16.0	3.22	35.4	16.2	36.03	25.7	16.7	36.95	28.0	16.7	59.42	30.0
17.0	3.41	35.1	17.2	35.68	25.7	17.7	37.23	28.2	17.7	60.42	30.0
18.0	3.56	34.8	18.2	35.33	25.6	18.7	37.52	28.3	18.7	61.44	30.0
19.0	3.69	34.5	19.2	34.98	25.5	19.7	37.82	28.4	19.7	62.50	30.0
20.0	3.82	34.3	20.2	34.58	25.4	20.7	38.13	28.6	20.7	63.61	30.0
21.0	3.96	34.0	21.2	34.19	25.4	21.7	38.45	28.7	21.7	64.77	30.1
22.0	4.13	33.7	22.2	33.78	25.3	22.7	38.77	28.9	22.7	65.97	30.1
23.0	4.36	33.3	23.2	33.35	25.1	23.7	39.08	29.1	23.7	67.17	30.2
24.0	4.66	33.0	24.2	32.93	25.0	24.7	39.39	29.3	24.7	68.36	30.3
25.0	5.03	32.7	25.2	32.53	24.8	25.7	39.68	29.5	25.7	69.53	30.4
26.0	5.46	32.4	26.2	32.16	24.6	26.7	39.94	29.7	26.7	70.64	30.5
27.0	5.93	32.1	27.2	31.82	24.5	27.7	40.19	30.0	27.7	71.69	30.7
27.9	6.42	31.8	28.2	31.50	24.3	28.6	40.43	30.2	28.7	72.68	30.8
28.9	6.91	31.6	29.2	31.20	24.1	29.6	40.66	30.4	29.7	73.62	30.9
29.9	7.37	31.4	30.2	30.91	23.9	30.6	40.88	30.6	30.7	74.52	31.1
30.9	7.78	31.1	31.2	30.62	23.8	31.6	41.11	30.8	31.7	75.42	31.2
31.9	8.15	30.9									

## CIRCUMPOLAR STARS.

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
May	<sup>h</sup> 1 <sup>m</sup> 17	+88° 42'	May	<sup>h</sup> 6 <sup>m</sup> 47	+87° 13'	May	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	May	<sup>h</sup> 19 <sup>m</sup> 36	+88° 57'
1.9	<sup>s</sup> 8.15	30.9	1.2	<sup>s</sup> 30.62	23.8	1.6	<sup>s</sup> 41.11	30.8	1.7	<sup>s</sup> 15.42	31.2
2.9	8.50	30.7	2.2	30.33	23.6	2.6	41.34	31.0	2.7	16.35	31.3
3.9	8.84	30.4	3.2	30.03	23.5	3.6	41.58	31.2	3.7	17.32	31.4
4.9	9.20	30.1	4.2	29.70	23.3	4.6	41.84	31.4	4.6	18.35	31.5
5.9	9.60	29.9	5.2	29.35	23.2	5.6	42.11	31.6	5.6	19.43	31.6
6.9	10.05	29.6	6.2	28.98	23.0	6.6	42.38	31.8	6.6	20.55	31.7
7.9	10.57	29.3	7.1	28.61	22.8	7.6	42.64	32.1	7.6	21.68	31.9
8.9	11.16	29.0	8.1	28.25	22.6	8.6	42.89	32.4	8.6	22.79	32.0
9.9	11.80	28.7	9.1	27.91	22.4	9.6	43.12	32.7	9.6	23.84	32.2
10.9	12.47	28.5	10.1	27.60	22.1	10.6	43.33	33.0	10.6	24.83	32.4
11.9	13.15	28.3	11.1	27.32	21.9	11.6	43.51	33.3	11.6	25.75	32.6
12.9	13.82	28.1	12.1	27.06	21.6	12.6	43.67	33.5	12.6	26.60	32.8
13.9	14.46	27.9	13.1	26.83	21.4	13.6	43.82	33.8	13.6	27.39	33.0
14.9	15.05	27.7	14.1	26.62	21.2	14.6	43.97	34.1	14.6	28.14	33.2
15.9	15.61	27.5	15.1	26.41	21.0	15.6	44.12	34.3	15.6	28.89	33.4
16.9	16.14	27.3	16.1	26.19	20.8	16.6	44.28	34.5	16.6	29.67	33.6
17.9	16.68	27.1	17.1	25.96	20.6	17.6	44.45	34.8	17.6	30.50	33.7
18.9	17.25	26.9	18.1	25.71	20.4	18.6	44.63	35.0	18.6	31.36	33.9
19.9	17.86	26.7	19.1	25.45	20.2	19.6	44.81	35.3	19.6	32.25	34.1
20.9	18.52	26.5	20.1	25.18	19.9	20.6	44.99	35.5	20.6	33.15	34.3
21.9	19.24	26.3	21.1	24.92	19.7	21.6	45.16	35.8	21.6	34.05	34.5
22.9	20.03	26.0	22.1	24.67	19.4	22.6	45.31	36.2	22.6	34.92	34.7
23.9	20.86	25.9	23.1	24.44	19.1	23.6	45.44	36.5	23.6	35.73	35.0
24.9	21.72	25.7	24.1	24.24	18.8	24.6	45.55	36.8	24.6	36.46	35.3
25.9	22.58	25.5	25.1	24.09	18.5	25.6	45.64	37.2	25.6	37.12	35.5
26.9	23.41	25.4	26.1	23.96	18.2	26.6	45.71	37.5	26.6	37.73	35.8
27.9	24.20	25.3	27.1	23.84	18.0	27.6	45.78	37.8	27.6	38.29	36.1
28.9	24.94	25.2	28.1	23.72	17.7	28.6	45.84	38.0	28.6	38.82	36.3
29.9	25.64	25.1	29.1	23.61	17.4	29.6	45.91	38.3	29.6	39.36	36.5
30.9	26.33	25.0	30.1	23.49	17.2	30.6	45.99	38.6	30.6	39.94	36.7
31.9	27.00	24.8	31.1	23.34	17.0	31.6	46.08	38.8	31.6	40.56	37.0
32.9	27.70	24.6	32.1	23.17	16.7	32.6	46.18	39.1	32.6	41.23	37.2

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hav.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
June	<sup>h</sup> 1 <sup>m</sup> 17	+88° 42'	June	<sup>h</sup> 6 <sup>m</sup> 47	+87° 13'	June	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	June	<sup>h</sup> 19 <sup>m</sup> 36	+88° 57'
	<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"
1.9	27.70	24.6	1.1	23.17	16.7	1.6	46.18	39.1	1.6	41.23	37.3
2.9	28.44	24.4	2.1	22.99	16.5	2.6	46.28	39.4	2.6	41.93	37.4
3.8	29.24	24.2	3.1	22.81	16.2	3.5	46.39	39.7	3.6	42.64	37.7
4.8	30.12	24.1	4.1	22.64	15.9	4.5	46.48	40.1	4.6	43.33	37.9
5.8	31.03	24.0	5.1	22.48	15.6	5.5	46.55	40.4	5.6	43.99	38.2
6.8	31.97	23.9	6.1	22.35	15.3	6.5	46.60	40.7	6.6	44.59	38.5
7.8	32.94	23.8	7.1	22.25	14.9	7.5	46.61	41.1	7.6	45.11	38.8
8.8	33.90	23.7	8.1	22.18	14.6	8.5	46.61	41.4	8.6	45.55	39.2
9.8	34.82	23.6	9.1	22.14	14.3	9.5	46.60	41.8	9.6	45.92	39.5
10.8	35.69	23.5	10.1	22.12	14.0	10.5	46.59	42.1	10.6	46.23	39.8
11.8	36.52	23.5	11.1	22.10	13.7	11.5	46.57	42.4	11.6	46.53	40.0
12.8	37.31	23.4	12.1	22.08	13.4	12.5	46.55	42.6	12.6	46.83	40.3
13.8	38.08	23.4	13.0	22.06	13.2	13.5	46.54	42.9	13.6	47.16	40.5
14.8	38.86	23.3	14.0	22.03	12.9	14.5	46.55	43.2	14.6	47.53	40.8
15.8	39.68	23.2	15.0	21.98	12.7	15.5	46.56	43.5	15.6	47.94	41.1
16.8	40.54	23.1	16.0	21.91	12.4	16.5	46.56	43.8	16.6	48.37	41.4
17.8	41.46	23.0	17.0	21.85	12.1	17.5	46.55	44.1	17.6	48.79	41.7
18.8	42.44	23.0	18.0	21.80	11.8	18.5	46.53	44.4	18.6	49.18	42.0
19.8	43.47	23.0	19.0	21.77	11.4	19.5	46.50	44.8	19.6	49.62	42.3
20.8	44.52	22.9	20.0	21.77	11.1	20.5	46.46	45.2	20.6	49.78	42.6
21.8	45.56	22.9	21.0	21.80	10.7	21.5	46.40	45.5	21.6	49.98	43.0
22.8	46.58	22.9	22.0	21.86	10.4	22.5	46.31	45.8	22.6	50.11	43.3
23.8	47.56	22.9	23.0	21.95	10.1	23.5	46.19	46.2	23.6	50.17	43.7
24.8	48.49	22.9	24.0	22.05	9.8	24.5	46.08	46.5	24.6	50.19	44.0
25.8	49.37	22.9	25.0	22.15	9.5	25.5	45.97	46.7	25.6	50.20	44.3
26.8	50.21	23.0	26.0	22.24	9.2	26.5	45.87	47.0	26.5	50.24	44.6
27.8	51.02	23.0	27.0	22.32	8.9	27.5	45.77	47.3	27.5	50.32	44.9
28.8	51.85	23.0	28.0	22.38	8.7	28.5	45.68	47.5	28.5	50.44	45.1
29.8	52.71	22.9	29.0	22.42	8.4	29.5	45.60	47.8	29.5	50.61	45.4
30.8	53.62	22.9	30.0	22.45	8.1	30.5	45.53	48.1	30.5	50.80	45.7
31.8	54.59	22.9	31.0	22.48	7.8	31.5	45.45	48.5	31.5	50.98	46.1



## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (HEV.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
July	<sup>h</sup> <sup>m</sup> 1 17	+88° 42'	July	<sup>h</sup> <sup>m</sup> 6 47	+87° 12'	July	<sup>h</sup> <sup>m</sup> 18 8	+86° 36'	July	<sup>h</sup> <sup>m</sup> 19 36	+88° 57'
1.8	<sup>s</sup> 54.58	22.9	1.0	<sup>s</sup> 22.48	67.8	1.5	<sup>s</sup> 45.45	48.5	1.5	<sup>s</sup> 50.98	46.1
2.8	55.59	22.9	2.0	22.53	67.5	2.5	45.35	48.8	2.5	51.12	46.4
3.8	56.63	22.9	3.0	22.60	67.1	3.5	45.23	49.1	3.5	51.20	46.7
4.8	57.69	22.9	4.0	22.69	66.8	4.5	45.09	49.5	4.5	51.21	47.1
5.8	58.74	23.0	5.0	22.82	66.5	5.5	44.93	49.8	5.5	51.15	47.5
6.8	59.77	23.1	6.0	22.98	66.1	6.5	44.75	50.1	6.5	51.00	47.8
7.8	60.75	23.2	7.0	23.16	65.8	7.5	44.57	50.4	7.5	50.79	48.2
8.8	61.66	23.3	8.0	23.35	65.5	8.5	44.39	50.7	8.5	50.55	48.5
9.8	62.53	23.4	9.0	23.55	65.2	9.5	44.20	50.9	9.5	50.30	48.8
10.7	63.37	23.4	10.0	23.74	65.0	10.4	44.01	51.2	10.5	50.08	49.1
11.7	64.20	23.5	11.0	23.91	64.7	11.4	43.83	51.4	11.5	49.89	49.3
12.7	65.04	23.6	12.0	24.06	64.5	12.4	43.66	51.7	12.5	49.73	49.6
13.7	65.91	23.7	13.0	24.20	64.2	13.4	43.50	52.0	13.5	49.60	49.9
14.7	66.83	23.7	14.0	24.35	63.9	14.4	43.34	52.3	14.5	49.48	50.2
15.7	67.82	23.8	15.0	24.50	63.6	15.4	43.17	52.6	15.5	49.33	50.6
16.7	68.86	23.9	16.0	24.67	63.3	16.4	42.97	52.9	16.5	49.13	50.9
17.7	69.92	24.0	17.0	24.86	62.9	17.4	42.75	53.2	17.5	48.88	51.3
18.7	70.98	24.1	18.0	25.08	62.6	18.4	42.51	53.5	18.5	48.57	51.7
19.7	72.01	24.2	18.9	25.34	62.3	19.4	42.26	53.8	19.5	48.17	52.0
20.7	73.00	24.4	19.9	25.62	62.0	20.4	42.00	54.1	20.5	47.70	52.4
21.7	73.94	24.6	20.9	25.92	61.7	21.4	41.73	54.3	21.5	47.19	52.7
22.7	74.82	24.8	21.9	26.22	61.4	22.4	41.46	54.6	22.5	46.66	53.0
23.7	75.65	25.0	22.9	26.52	61.1	23.4	41.20	54.8	23.5	46.14	53.3
24.7	76.45	25.1	23.9	26.80	60.9	24.4	40.95	55.0	24.5	45.66	53.6
25.7	77.24	25.2	24.9	27.07	60.7	25.4	40.71	55.2	25.5	45.22	53.9
26.7	78.04	25.4	25.9	27.31	60.4	26.4	40.47	55.4	26.5	44.82	54.1
27.7	78.88	25.5	26.9	27.53	60.2	27.4	40.24	55.7	27.5	44.46	54.4
28.7	79.77	25.6	27.9	27.75	59.9	28.4	40.01	55.9	28.5	44.10	54.7
29.7	80.71	25.7	28.9	27.99	59.6	29.4	39.77	56.2	29.5	43.71	55.1
30.7	81.68	25.9	29.9	28.24	59.3	30.4	39.52	56.5	30.5	43.28	55.4
31.7	82.67	26.1	30.9	28.51	59.0	31.4	39.24	56.7	31.5	42.79	55.7
32.7	83.66	26.3	31.9	28.81	58.7	32.4	38.93	57.0	32.5	42.22	56.1

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hrv.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Aug.	<sup>h</sup> 1 <sup>m</sup> 18	+88° 42'	Aug.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 12'	Aug.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	Aug.	<sup>h</sup> 19 <sup>m</sup> 36	+88° 57'
	<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"		<sup>s</sup>	"
1.7	23.66	26.3	1.9	29.15	58.4	1.4	38.93	57.0	1.5	42.22	56.1
2.7	24.62	26.5	2.9	29.51	58.2	2.4	38.61	57.3	2.4	41.57	56.4
3.7	25.52	26.7	3.9	29.88	57.9	3.4	38.28	57.5	3.4	40.85	56.7
4.7	26.37	27.0	4.9	30.26	57.7	4.4	37.95	57.7	4.4	40.08	57.0
5.7	27.16	27.2	5.9	30.64	57.5	5.4	37.62	57.9	5.4	39.31	57.3
6.7	27.89	27.4	6.9	31.00	57.3	6.4	37.30	58.1	6.4	38.55	57.6
7.7	28.60	27.6	7.9	31.34	57.1	7.4	36.99	58.2	7.4	37.83	57.9
8.7	29.32	27.8	8.9	31.67	56.8	8.4	36.68	58.4	8.4	37.14	58.1
9.7	30.07	28.0	9.9	31.99	56.6	9.4	36.38	58.6	9.4	36.48	58.4
10.7	30.86	28.2	10.9	32.31	56.4	10.4	36.08	58.8	10.4	35.85	58.7
11.7	31.69	28.4	11.9	32.64	56.1	11.4	35.77	59.0	11.4	35.20	59.0
12.7	32.56	28.6	12.9	32.99	55.9	12.4	35.46	59.2	12.4	34.52	59.3
13.7	33.46	28.9	13.9	33.38	55.6	13.4	35.13	59.4	13.4	33.79	59.6
14.7	34.37	29.1	14.9	33.79	55.3	14.4	34.77	59.7	14.4	33.00	59.9
15.6	35.26	29.4	15.9	34.22	55.1	15.4	34.40	59.9	15.4	32.13	60.2
16.6	36.12	29.7	16.9	34.67	54.8	16.3	34.02	60.1	16.4	31.19	60.5
17.6	36.92	30.0	17.9	35.12	54.6	17.3	33.63	60.2	17.4	30.20	60.8
18.6	37.65	30.3	18.9	35.58	54.4	18.3	33.23	60.4	18.4	29.19	61.1
19.6	38.32	30.6	19.9	36.03	54.3	19.3	32.84	60.5	19.4	28.18	61.3
20.6	38.95	30.9	20.9	36.46	54.1	20.3	32.47	60.6	20.4	27.19	61.6
21.6	39.55	31.1	21.9	36.86	53.9	21.3	32.11	60.8	21.4	26.25	61.8
22.6	40.15	31.4	22.9	37.24	53.8	22.3	31.76	60.9	22.4	25.36	62.1
23.6	40.78	31.7	23.9	37.61	53.6	23.3	31.42	61.0	23.4	24.51	62.3
24.6	41.45	31.9	24.9	37.98	53.4	24.3	31.09	61.1	24.4	23.69	62.5
25.6	42.17	32.1	25.8	38.36	53.2	25.3	30.75	61.3	25.4	22.87	62.8
26.6	42.92	32.4	26.8	38.77	53.0	26.3	30.39	61.5	26.4	22.00	63.0
27.6	43.69	32.7	27.8	39.20	52.8	27.3	30.02	61.7	27.4	21.07	63.3
28.6	44.45	33.0	28.8	39.66	52.6	28.3	29.62	61.8	28.4	20.07	63.6
29.6	45.20	33.3	29.8	40.15	52.4	29.3	29.21	62.0	29.4	19.00	63.9
30.6	45.90	33.6	30.8	40.66	52.2	30.3	28.79	62.1	30.4	17.87	64.1
31.6	46.54	33.9	31.8	41.17	52.0	31.3	28.36	62.2	31.4	16.68	64.4
32.6	47.11	34.3	32.8	41.67	51.9	32.3	27.94	62.3	32.4	15.47	64.6

## CIRCUMPOLAR STARS.

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\epsilon$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hæv.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Sept.	<sup>h</sup> 1 <sup>m</sup> 18	+88° 42'	Sept.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 12'	Sept.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 37'	Sept.	<sup>h</sup> 19 <sup>m</sup> 35	+88° 58'
1.6	47.11	34.3	1.8	41.67	51.9	1.3	27.94	2.3	1.4	75.47	4.6
2.6	47.63	34.6	2.8	42.16	51.8	2.3	27.52	2.4	2.4	74.28	4.8
3.6	48.11	34.9	3.8	42.64	51.7	3.3	27.11	2.4	3.4	73.13	5.0
4.6	48.58	35.3	4.8	43.10	51.6	4.3	26.72	2.5	4.4	72.01	5.2
5.6	49.06	35.6	5.8	43.54	51.4	5.3	26.34	2.5	5.4	70.93	5.4
6.6	49.56	35.9	6.8	43.98	51.3	6.3	25.96	2.6	6.4	69.89	5.6
7.6	50.11	36.2	7.8	44.42	51.2	7.3	25.57	2.7	7.4	68.85	5.8
8.6	50.71	36.5	8.8	44.87	51.0	8.3	25.18	2.8	8.3	67.79	6.0
9.6	51.34	36.8	9.8	45.35	50.8	9.3	24.78	2.9	9.3	66.69	6.2
10.6	51.98	37.1	10.8	45.86	50.7	10.3	24.37	3.0	10.3	65.53	6.5
11.6	52.61	37.5	11.8	46.40	50.5	11.3	23.93	3.1	11.3	64.31	6.7
12.6	53.20	37.8	12.8	46.95	50.4	12.3	23.48	3.2	12.3	63.04	6.9
13.6	53.74	38.2	13.8	47.51	50.3	13.3	23.02	3.2	13.3	61.70	7.1
14.6	54.22	38.6	14.8	48.07	50.2	14.3	22.56	3.3	14.3	60.32	7.3
15.6	54.63	39.0	15.8	48.62	50.1	15.3	22.11	3.3	15.3	58.95	7.5
16.6	54.98	39.4	16.8	49.15	50.0	16.3	21.67	3.3	16.3	57.60	7.6
17.6	55.28	39.7	17.8	49.65	50.0	17.3	21.24	3.3	17.3	56.30	7.8
18.6	55.59	40.1	18.8	50.13	49.9	18.3	20.83	3.3	18.3	55.06	7.9
19.6	55.91	40.4	19.8	50.60	49.9	19.3	20.44	3.3	19.3	53.87	8.0
20.6	56.26	40.7	20.8	51.06	49.8	20.3	20.06	3.3	20.3	52.71	8.1
21.5	56.63	41.0	21.8	51.51	49.7	21.3	19.67	3.3	21.3	51.56	8.3
22.5	57.05	41.4	22.8	51.98	49.6	22.3	19.27	3.3	22.3	50.40	8.4
23.5	57.50	41.7	23.8	52.48	49.5	23.3	18.86	3.4	23.3	49.20	8.6
24.5	57.95	42.1	24.8	53.00	49.4	24.2	18.43	3.4	24.3	47.93	8.8
25.5	58.39	42.4	25.8	53.55	49.3	25.2	17.98	3.4	25.3	46.60	9.0
26.5	58.79	42.8	26.8	54.12	49.2	26.2	17.52	3.4	26.3	45.20	9.1
27.5	59.12	43.2	27.8	54.70	49.2	27.2	17.06	3.4	27.3	43.75	9.3
28.5	59.38	43.6	28.8	55.28	49.2	28.2	16.61	3.4	28.3	42.27	9.4
29.5	59.58	44.0	29.8	55.84	49.2	29.2	16.16	3.3	29.3	40.81	9.5
30.5	59.73	44.4	30.8	56.38	49.2	30.2	15.72	3.3	30.3	39.38	9.6
31.5	59.85	44.8	31.7	56.90	49.2	31.2	15.29	3.2	31.3	37.99	9.6

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (HEV.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Oct.	<sup>h</sup> 1 <sup>m</sup> 18	+88° 42'	Oct.	<sup>h</sup> 6 <sup>m</sup> 47	+87° 12'	Oct.	<sup>h</sup> 18 <sup>m</sup> 8	+86° 36'	Oct.	<sup>h</sup> 19 <sup>m</sup> 34	+88° 58'
1.5	<sup>s</sup> 59.85	44.8	1.7	<sup>s</sup> 56.90	49.2	1.2	<sup>s</sup> 15.29	63.2	1.3	<sup>s</sup> 97.99	9.6
2.5	59.96	45.2	2.7	57.40	49.2	2.2	14.88	63.1	2.3	96.65	9.7
3.5	60.10	45.5	3.7	57.89	49.2	3.2	14.48	63.0	3.3	95.35	9.8
4.5	60.28	45.9	4.7	58.38	49.2	4.2	14.09	63.0	4.3	94.07	9.9
5.5	60.50	46.2	5.7	58.88	49.1	5.2	13.69	63.0	5.3	92.80	10.0
6.5	60.76	46.6	6.7	59.39	49.1	6.2	13.29	62.9	6.3	91.50	10.1
7.5	61.03	46.9	7.7	59.93	49.0	7.2	12.87	62.9	7.3	90.16	10.2
8.5	61.29	47.3	8.7	60.49	49.0	8.2	12.43	62.9	8.3	88.77	10.3
9.5	61.52	47.7	9.7	61.07	49.0	9.2	11.98	62.8	9.3	87.32	10.4
10.5	61.71	48.1	10.7	61.66	49.0	10.2	11.53	62.8	10.3	85.82	10.5
11.5	61.84	48.6	11.7	62.25	49.0	11.2	11.08	62.7	11.3	84.28	10.6
12.5	61.90	49.0	12.7	62.83	49.0	12.2	10.63	62.6	12.3	82.73	10.6
13.5	61.90	49.4	13.7	63.39	49.1	13.2	10.19	62.4	13.3	81.20	10.6
14.5	61.84	49.8	14.7	63.93	49.2	14.2	9.77	62.3	14.2	79.72	10.6
15.5	61.76	50.2	15.7	64.44	49.2	15.2	9.37	62.1	15.2	78.30	10.6
16.5	61.68	50.5	16.7	64.92	49.3	16.2	8.99	62.0	16.2	76.95	10.6
17.5	61.62	50.9	17.7	65.39	49.4	17.2	8.63	61.9	17.2	75.65	10.6
18.5	61.60	51.2	18.7	65.86	49.4	18.2	8.27	61.8	18.2	74.37	10.6
19.5	61.61	51.6	19.7	66.34	49.5	19.2	7.90	61.6	19.2	73.11	10.7
20.5	61.66	51.9	20.7	66.83	49.5	20.2	7.52	61.5	20.2	71.83	10.7
21.5	61.72	52.3	21.7	67.34	49.5	21.2	7.13	61.4	21.2	70.49	10.8
22.5	61.77	52.7	22.7	67.88	49.6	22.2	6.73	61.3	22.2	69.09	10.8
23.5	61.78	53.1	23.7	68.44	49.6	23.2	6.31	61.2	23.2	67.64	10.8
24.5	61.73	53.5	24.7	69.01	49.7	24.2	5.89	61.1	24.2	66.14	10.8
25.5	61.63	53.9	25.7	69.57	49.8	25.2	5.47	60.9	25.2	64.60	10.8
26.5	61.45	54.3	26.7	70.11	49.9	26.2	5.06	60.7	26.2	63.06	10.8
27.5	61.21	54.7	27.7	70.64	50.1	27.2	4.65	60.5	27.2	61.56	10.7
28.4	60.93	55.1	28.7	71.15	50.2	28.1	4.26	60.3	28.2	60.11	10.7
29.4	60.64	55.4	29.7	71.63	50.3	29.1	3.90	60.1	29.2	58.72	10.6
30.4	60.37	55.8	30.7	72.09	50.4	30.1	3.56	59.9	30.2	57.38	10.5
31.4	60.13	56.1	31.7	72.54	50.6	31.1	3.22	59.7	31.2	56.09	10.5
32.4	59.92	56.5	32.7	73.00	50.7	32.1	2.88	59.5	32.2	54.82	10.4

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hæv.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Nov.	<sup>h</sup> 1 <sup>m</sup> 18	+88° 42'	Nov.	<sup>h</sup> 6 <sup>m</sup> 48	+87° 12'	Nov.	<sup>h</sup> 18 <sup>m</sup> 7	+86° 36'	Nov.	<sup>h</sup> 19 <sup>m</sup> 34	+88° 58'
1.4	59.92	56.5	1.7	13.00	50.7	1.1	62.88	59.5	1.2	54.89	10.4
2.4	59.75	56.8	2.7	13.47	50.8	2.1	62.54	59.4	2.2	53.55	10.4
3.4	59.61	57.2	3.7	13.95	50.9	3.1	62.19	59.2	3.2	52.24	10.3
4.4	59.47	57.5	4.7	14.46	51.0	4.1	61.83	59.0	4.2	50.88	10.3
5.4	59.31	57.9	5.7	14.99	51.1	5.1	61.45	58.9	5.2	49.47	10.3
6.4	59.10	58.3	6.6	15.53	51.2	6.1	61.07	58.7	6.2	48.02	10.2
7.4	58.84	58.7	7.6	16.07	51.4	7.1	60.69	58.5	7.2	46.54	10.2
8.4	58.51	59.1	8.6	16.60	51.5	8.1	60.32	58.2	8.2	45.05	10.1
9.4	58.11	59.5	9.6	17.11	51.7	9.1	59.96	58.0	9.2	43.57	10.0
10.4	57.65	59.8	10.6	17.59	51.9	10.1	59.62	57.7	10.2	42.15	9.8
11.4	57.15	60.2	11.6	18.03	52.1	11.1	59.30	57.4	11.2	40.80	9.7
12.4	56.65	60.5	12.6	18.45	52.3	12.1	59.00	57.2	12.2	39.52	9.5
13.4	56.16	60.8	13.6	18.85	52.5	13.1	58.71	56.9	13.2	38.30	9.4
14.4	55.70	61.1	14.6	19.24	52.7	14.1	58.43	56.6	14.2	37.13	9.3
15.4	55.28	61.4	15.6	19.63	52.9	15.1	58.16	56.4	15.2	35.99	9.1
16.4	54.90	61.7	16.6	20.03	53.0	16.1	57.89	56.2	16.2	34.84	9.0
17.4	54.54	62.0	17.6	20.45	53.2	17.1	57.61	56.0	17.2	33.66	8.9
18.4	54.17	62.3	18.6	20.89	53.4	18.1	57.32	55.8	18.2	32.44	8.8
19.4	53.78	62.7	19.6	21.34	53.5	19.1	57.02	55.5	19.2	31.17	8.7
20.4	53.35	63.0	20.6	21.80	53.7	20.1	56.71	55.3	20.1	29.86	8.6
21.4	52.86	63.4	21.6	22.26	54.0	21.1	56.40	55.0	21.1	28.52	8.4
22.4	52.29	63.7	22.6	22.72	54.2	22.1	56.10	54.7	22.1	27.18	8.3
23.4	51.66	64.1	23.6	23.15	54.4	23.1	55.82	54.4	23.1	25.87	8.1
24.4	50.99	64.4	24.6	23.55	54.7	24.1	55.56	54.1	24.1	24.61	7.9
25.4	50.29	64.7	25.6	23.92	55.0	25.1	55.31	53.7	25.1	23.41	7.7
26.4	49.60	65.0	26.6	24.27	55.2	26.1	55.08	53.4	26.1	22.28	7.4
27.4	48.93	65.3	27.6	24.61	55.5	27.1	54.87	53.1	27.1	21.21	7.2
28.4	48.30	65.5	28.6	24.93	55.7	28.1	54.66	52.8	28.1	20.19	7.0
29.4	47.72	65.8	29.6	25.26	55.9	29.1	54.46	52.5	29.1	19.17	6.8
30.4	47.17	66.0	30.6	25.60	56.1	30.1	54.25	52.3	30.1	18.14	6.7
31.4	46.63	66.3	31.6	25.96	56.4	31.1	54.03	52.0	31.1	17.09	6.5

## CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\epsilon$ Ursæ Minoris. (Polaris.)		Mean Solar Date.	51 Cephei (Hav.)		Mean Solar Date.	$\delta$ Ursæ Minoris.		Mean Solar Date.	$\lambda$ Ursæ Minoris.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
Dec.	<sup>h</sup> <sup>m</sup> 1 18	+88° 43'	Dec.	<sup>h</sup> <sup>m</sup> 6 48	+87° 12'	Dec.	<sup>h</sup> <sup>m</sup> 18 7	+86° 36'	Dec.	<sup>h</sup> <sup>m</sup> 19 33	+88° 57'
1.4	46.63	6.3	1.6	25.96	56.4	1.1	54.03	52.0	1.1	77.09	66.5
2.4	46.09	6.6	2.6	26.34	56.6	2.1	53.80	51.7	2.1	76.00	66.3
3.3	45.51	6.9	3.6	26.73	56.8	3.1	53.56	51.4	3.1	74.87	66.2
4.3	44.88	7.2	4.6	27.11	57.1	4.0	53.32	51.1	4.1	73.70	66.0
5.3	44.19	7.5	5.6	27.49	57.3	5.0	53.09	50.8	5.1	72.53	65.7
6.3	43.44	7.8	6.6	27.86	57.6	6.0	52.87	50.5	6.1	71.37	65.5
7.3	42.62	8.1	7.6	28.20	57.9	7.0	52.67	50.1	7.1	70.26	65.2
8.3	41.76	8.3	8.6	28.51	58.3	8.0	52.50	49.7	8.1	69.22	65.0
9.3	40.89	8.6	9.6	28.78	58.6	9.0	52.35	49.4	9.1	68.26	64.7
10.3	40.03	8.8	10.6	29.02	58.9	10.0	52.22	49.0	10.1	67.38	64.4
11.3	39.19	9.0	11.6	29.24	59.2	11.0	52.10	48.7	11.1	66.57	64.1
12.3	38.39	9.2	12.5	29.46	59.5	12.0	51.99	48.4	12.1	65.81	63.9
13.3	37.63	9.3	13.5	29.68	59.7	13.0	51.89	48.1	13.1	65.06	63.6
14.3	36.91	9.5	14.5	29.91	60.0	14.0	51.78	47.8	14.1	64.39	63.4
15.3	36.20	9.7	15.5	30.16	60.3	15.0	51.67	47.5	15.1	63.49	63.2
16.3	35.48	9.9	16.5	30.42	60.5	16.0	51.54	47.2	16.1	62.67	62.9
17.3	34.73	10.2	17.5	30.69	60.8	17.0	51.40	46.8	17.1	61.80	62.7
18.3	33.92	10.4	18.5	30.97	61.2	18.0	51.26	46.5	18.1	60.89	62.4
19.3	33.06	10.6	19.5	31.24	61.4	19.0	51.13	46.1	19.1	59.99	62.2
20.3	32.13	10.8	20.5	31.49	61.8	20.0	51.02	45.8	20.1	59.12	61.9
21.3	31.14	11.0	21.5	31.70	62.1	21.0	50.92	45.4	21.1	58.30	61.6
22.3	30.13	11.2	22.5	31.88	62.4	22.0	50.84	45.0	22.1	57.55	61.2
23.3	29.13	11.4	23.5	32.04	62.8	23.0	50.77	44.6	23.1	56.88	60.9
24.3	28.14	11.5	24.5	32.17	63.2	24.0	50.72	44.3	24.1	56.28	60.6
25.3	27.19	11.6	25.5	32.28	63.5	25.0	50.70	43.9	25.1	55.73	60.3
26.3	26.30	11.7	26.5	32.40	63.8	26.0	50.69	43.6	26.0	55.21	60.0
27.3	25.46	11.9	27.5	32.53	64.1	27.0	50.67	43.3	27.0	54.70	59.7
28.3	24.64	12.0	28.5	32.68	64.3	28.0	50.64	42.9	28.0	54.17	59.4
29.3	23.83	12.1	29.5	32.84	64.6	29.0	50.60	42.6	29.0	53.61	59.1
30.3	23.00	12.2	30.5	33.00	64.9	30.0	50.56	42.3	30.0	53.03	58.9
31.3	22.14	12.4	31.5	33.17	65.2	31.0	50.51	42.0	31.0	52.42	58.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Andromedæ.		$\gamma$ Pegasi. (Algenib.)		$\beta$ Hydri.		12 Ceti.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 0 <sup>m</sup> 2	+28° 28'	<sup>h</sup> 0 <sup>m</sup> 7	+14° 33'	<sup>h</sup> 0 <sup>m</sup> 19	-77° 52'	<sup>h</sup> 0 <sup>m</sup> 24	-4° 34'
Jan. 0.2	35.16 -15	22.5 -0.8	27.27 -12	37.4 -0.8	47.93 -0.92	92.2 +0.8	18.48 -19	43.1 -0.7
10.2	35.02 .14	21.6 1.1	27.15 .19	36.6 0.9	47.03 .86	91.1 1.3	18.36 .19	43.8 0.6
20.2	34.88 .13	20.3 1.4	27.03 .11	35.6 1.0	46.21 .78	89.5 1.9	18.25 .11	44.3 0.5
30.2	34.75 .19	18.9 1.5	26.93 .10	34.5 1.1	45.46 .69	87.3 2.4	18.14 .10	44.7 0.4
Feb. 9.1	34.64 .10	17.3 1.6	26.84 .08	33.4 1.1	44.83 .58	84.7 2.8	18.05 .06	45.0 -0.2
19.1	34.56 -0.7	15.6 -1.7	26.77 -0.5	32.4 -1.0	44.31 -0.45	81.7 +3.2	17.98 -0.6	45.1 0.0
29.1	34.51 -0.3	14.0 1.6	26.73 -0.3	31.4 0.9	43.93 .31	78.3 3.5	17.93 .04	45.0 +0.2
Mar. 10.0	34.49 +0.1	12.4 1.5	26.71 .00	30.6 0.7	43.69 -1.6	74.7 3.7	17.90 -0.1	44.8 0.4
20.0	34.52 .05	11.0 1.3	26.74 +0.4	29.9 0.5	43.61 .00	71.0 3.8	17.91 +0.3	44.2 0.6
30.0	34.59 .09	9.7 1.1	26.80 .09	29.5 -0.3	43.68 +1.5	67.1 3.8	17.96 .07	43.5 0.9
Apr. 9.0	34.71 +1.4	8.8 -0.8	26.91 +1.3	29.4 0.0	43.92 +3.1	63.3 +3.8	18.05 +1.1	42.5 +1.1
18.9	34.87 .18	8.2 -0.4	27.06 .17	29.5 +0.3	44.31 .46	59.6 3.6	18.18 .15	41.3 1.3
28.9	35.08 .33	8.0 0.0	27.25 .31	30.0 0.6	44.84 .61	56.1 3.4	18.35 .19	39.8 1.6
May 8.9	35.33 .36	8.1 +0.3	27.47 .34	30.8 0.9	45.52 .75	52.8 3.1	18.55 .22	38.1 1.7
18.8	35.61 .39	8.7 0.7	27.73 .37	31.9 1.2	46.34 .86	49.9 2.8	18.60 .25	36.3 1.9
28.8	35.91 +3.1	9.6 +1.1	28.02 +3.9	33.3 +1.5	47.26 +0.96	47.3 +2.3	19.06 +2.8	34.4 +2.0
June 7.8	36.24 .33	10.9 1.5	28.32 .31	34.9 1.7	48.26 1.04	45.2 1.9	19.35 .30	32.3 2.0
17.8	36.58 .34	12.6 1.8	28.63 .31	36.7 1.9	49.34 1.10	43.6 1.4	19.66 .31	30.3 2.0
27.7	36.91 .33	14.4 2.0	28.95 .31	38.7 2.0	50.46 1.19	42.5 0.8	19.97 .31	28.2 2.0
July 7.7	37.24 .39	16.6 2.2	29.26 .30	40.8 2.1	51.59 1.19	41.9 +0.3	20.28 .30	26.3 1.9
17.7	37.55 +3.0	18.9 +2.4	29.55 +2.8	43.0 +2.1	52.70 +1.08	41.9 -0.3	20.57 +2.9	24.4 +1.7
27.7	37.84 .37	21.3 2.4	29.83 .36	45.1 2.1	53.76 1.02	42.6 0.9	20.85 .37	22.8 1.5
Aug. 6.6	38.09 .34	23.8 2.5	30.07 .33	47.2 2.0	54.74 .92	43.8 1.4	21.11 .34	21.4 1.3
16.6	38.31 .30	26.2 2.4	30.29 .30	49.2 1.9	55.60 .80	45.4 1.9	21.34 .31	20.2 1.1
26.6	38.49 .16	28.7 2.4	30.47 .16	51.0 1.7	56.33 .65	47.6 2.3	21.53 .18	19.3 0.8
Sept. 5.5	38.63 +1.2	31.0 +2.3	30.61 +1.2	52.6 +1.6	56.90 +4.8	50.1 -2.7	21.69 +1.4	18.6 +0.5
15.5	38.73 +0.8	33.2 2.1	30.71 .08	54.1 1.4	57.30 .30	52.9 2.9	21.81 .10	18.2 +0.2
25.5	38.79 +0.4	35.3 1.9	30.78 .05	55.4 1.1	57.51 +1.1	55.9 3.1	21.89 .07	18.1 0.0
Oct. 5.5	38.81 .00	37.1 1.7	30.81 +0.1	56.4 0.9	57.53 -0.08	59.0 3.1	21.94 +0.3	18.3 -0.2
15.4	38.80 -0.3	38.7 1.5	30.80 -0.2	57.2 0.6	57.35 .36	62.1 3.0	21.95 .00	18.6 0.4
25.4	38.75 -0.6	40.0 +1.2	30.77 -0.5	57.8 +0.5	57.00 -0.43	65.0 -2.7	21.94 -0.3	19.1 -0.6
Nov. 4.4	38.68 .08	41.1 0.9	30.71 .07	58.1 +0.2	56.49 .58	67.5 2.4	21.90 .05	19.7 0.7
14.4	38.59 .10	41.8 0.6	30.64 .08	58.3 0.0	55.83 .71	69.8 2.0	21.84 .07	20.5 0.8
24.3	38.48 .12	42.2 +0.3	30.55 .10	58.2 -0.2	55.07 .81	71.5 1.5	21.76 .09	21.3 0.8
Dec. 4.3	38.35 .13	42.4 0.0	30.44 .11	57.9 0.4	54.22 .87	72.7 0.9	21.66 .10	22.0 0.8
14.3	38.21 -1.4	42.3 -0.3	30.32 -1.2	57.5 -0.5	53.32 -0.91	73.2 -0.3	21.56 -1.1	22.9 -0.8
24.2	38.06 .14	41.7 0.6	30.20 .12	56.8 0.7	52.40 .92	73.2 +0.4	21.45 .11	23.6 0.7
34.2	37.92 -1.4	41.0 -0.2	30.08 -1.2	56.1 -0.8	51.50 -0.20	72.5 +1.0	21.33 -1.2	24.3 -0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Cassiope.		$\beta$ Ceti.		21 Cassiope.		$\epsilon$ Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 0 34	<sup>m</sup> +55 55'	<sup>h</sup> 0 37	<sup>m</sup> -18 35'	<sup>h</sup> 0 38	<sup>m</sup> +74 22'	<sup>h</sup> 0 57	<sup>m</sup> + 7 17'
Jan. 0.3	9.07 -30	32.6 -0.2	57.16 -13	79.7 -0.6	16.11 -72	45.7 +0.2	7.21 -12	7.6 -0.7
10.2	8.77 .30	32.1 0.7	57.03 .13	80.2 0.4	15.38 .72	45.7 -0.4	7.08 .12	6.9 0.7
20.2	8.47 .29	31.1 1.2	56.91 .12	80.4 -0.1	14.65 .71	45.0 1.0	6.96 .12	6.2 0.7
30.2	8.19 .27	29.7 1.6	56.79 .11	80.4 +0.1	13.96 .68	43.7 1.5	6.84 .12	5.5 0.7
Feb. 9.1	7.93 .24	27.8 2.0	56.68 .10	80.1 0.4	13.33 .59	41.9 2.0	6.72 .11	4.8 0.6
19.1	7.71 -19	25.7 -2.3	56.59 -08	79.6 +0.7	12.78 -49	39.7 -2.4	6.62 -09	4.2 -0.5
29.1	7.54 .14	23.3 2.5	56.52 .06	78.7 1.0	12.34 .37	37.1 2.7	6.53 .07	3.7 0.4
Mar. 10.1	7.43 .08	20.7 2.5	56.48 -09	77.6 1.2	12.03 .24	34.2 2.9	6.48 -04	3.3 0.3
20.0	7.39 -01	18.2 2.5	56.48 +01	76.3 1.5	11.87 -08	31.2 3.0	6.46 .00	3.1 -0.1
30.0	7.42 +07	15.7 2.4	56.51 .05	74.7 1.7	11.86 +09	28.2 2.9	6.47 +04	3.2 +0.1
Apr. 9.0	7.52 +14	13.4 -2.2	56.59 +09	72.9 +1.2	12.00 +22	25.3 -2.2	6.53 +08	3.4 +0.4
19.0	7.70 .21	11.3 1.9	56.70 .14	70.9 2.2	12.30 .37	22.7 2.6	6.63 .12	4.0 0.6
29.9	7.95 .26	9.7 1.4	56.86 .18	68.7 2.2	12.73 .50	20.2 2.2	6.77 .16	4.7 0.9
May 8.9	8.26 .34	8.4 1.0	57.06 .22	66.5 2.3	13.29 .61	18.4 1.7	6.95 .20	5.8 1.2
18.9	8.63 .39	7.6 0.6	57.29 .26	64.1 2.4	13.96 .71	16.9 1.2	7.17 .24	7.1 1.4
28.8	9.04 +43	7.3 -0.1	57.56 +28	61.7 +2.3	14.72 +79	16.0 -0.7	7.42 +27	8.6 +1.6
June 7.8	9.48 .45	7.5 +0.4	57.85 .30	59.4 2.3	15.54 .24	15.5 -0.2	7.70 .29	10.3 1.8
17.8	9.95 .47	8.1 0.9	58.16 .32	57.2 2.2	16.40 .27	15.6 +0.1	8.00 .30	12.1 1.9
27.8	10.42 .47	9.3 1.4	58.48 .32	55.1 2.0	17.27 .27	16.3 0.9	8.31 .31	14.0 1.9
July 7.7	10.89 .46	10.9 1.8	58.81 .32	53.2 1.7	18.14 .25	17.5 1.5	8.62 .31	16.0 2.0
17.7	11.34 +44	12.9 +2.2	59.12 +31	51.6 +1.5	18.97 +21	19.2 +1.2	8.92 +30	18.0 +2.0
27.7	11.76 .40	15.3 2.5	59.42 .29	50.3 1.1	19.75 .75	21.4 2.4	9.21 .28	19.9 1.9
Aug. 6.7	12.14 .36	18.0 2.8	59.70 .26	49.3 0.8	20.46 .68	23.9 2.7	9.49 .26	21.7 1.7
16.6	12.48 .31	20.9 3.0	59.94 .23	48.7 0.5	21.10 .59	26.8 2.1	9.73 .23	23.4 1.6
26.6	12.77 .26	23.9 3.1	60.16 .20	48.4 +0.1	21.63 .48	30.0 2.3	9.95 .20	24.8 1.4
Sept. 5.6	13.01 +20	27.1 +3.2	60.33 +16	48.5 -0.2	22.07 +38	33.5 +3.5	10.13 +17	26.1 +1.1
15.5	13.18 .15	30.3 3.2	60.47 .12	48.9 0.5	22.39 .27	37.0 3.6	10.28 .13	27.1 0.9
25.5	13.31 .09	33.5 3.2	60.57 .08	49.6 0.8	22.60 .15	40.7 3.7	10.40 .10	28.0 0.7
Oct. 5.5	13.37 +04	36.7 3.1	60.63 .04	50.6 1.1	22.69 +02	44.4 3.6	10.48 .08	28.5 0.5
15.5	13.38 -09	39.7 2.9	60.66 +01	51.7 1.2	22.66 -09	47.9 3.5	10.53 +03	28.9 0.3
25.4	13.33 -07	42.5 +2.6	60.65 -09	53.0 -1.3	22.52 -20	51.4 +3.3	10.55 .00	29.1 +0.1
Nov. 4.4	13.24 .12	45.0 2.3	60.62 .05	54.4 1.4	22.26 .31	54.6 3.0	10.54 -02	29.1 -0.1
14.4	13.09 .16	47.2 2.0	60.55 .07	55.7 1.3	21.89 .41	57.5 2.7	10.51 .04	28.9 0.2
24.3	12.91 .20	49.0 1.6	60.47 .09	57.1 1.2	21.43 .51	60.0 2.3	10.45 .06	28.6 0.4
Dec. 4.3	12.69 .24	50.3 1.1	60.37 .11	58.2 1.1	20.87 .59	62.0 1.8	10.38 .08	28.1 0.5
14.3	12.44 -26	51.2 +0.6	60.26 -12	59.3 -1.0	20.24 -66	63.6 +1.2	10.29 -10	27.6 -0.6
24.3	12.16 .28	51.6 +0.1	60.14 .12	60.1 0.7	19.56 .70	64.5 0.7	10.18 .11	27.0 0.6
34.2	11.87 -30	51.5 -0.4	60.01 -12	60.8 -0.5	18.83 -72	64.9 +0.1	10.07 -12	26.3 -0.7



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Andromeds.		$\theta^1$ Ceti.		38 Cassiope.		$\gamma$ Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	$^h \quad ^m$ 1 3	$+35^\circ \quad '$ 1	$^h \quad ^m$ 1 18	$-8^\circ \quad '$ 45	$^h \quad ^m$ 1 22	$+69^\circ \quad '$ 40	$^h \quad ^m$ 1 25	$+14^\circ \quad '$ 45
Jan. 0.3	27.38 -16	39.2 -0.3	24.92 -12	52.9 -0.8	54.96 -50	87.1 +0.7	29.01 -12	62.1 -0.5
10.2	27.22 .17	38.7 0.6	24.79 .13	53.6 0.6	54.44 .53	87.5 +0.2	28.89 .13	61.5 0.6
20.2	27.04 .17	37.9 0.9	24.66 .13	54.2 0.5	53.90 .54	87.4 -0.4	28.75 .14	60.8 0.7
30.2	26.87 .17	36.8 1.2	24.53 .13	54.6 0.3	53.35 .53	86.6 1.0	28.61 .14	60.0 0.8
Feb. 9.2	26.70 .16	35.5 1.4	24.41 .19	54.8 -0.1	52.83 .50	85.4 1.5	28.48 .13	59.2 0.8
19.1	26.55 -13	34.0 -1.6	24.29 -11	54.7 +0.1	52.35 -45	83.6 -2.0	28.35 -12	58.4 -0.8
29.1	26.43 .10	32.4 1.7	24.19 .08	54.5 0.4	51.94 .37	81.5 2.3	28.24 .10	57.7 0.7
Mar. 10.1	26.35 .06	30.7 1.7	24.12 .06	54.0 0.6	51.61 .28	79.0 2.6	28.16 .07	57.0 0.8
20.1	26.30 -02	29.1 1.6	24.08 -03	53.2 0.8	51.39 .17	76.3 2.7	28.11 -03	56.4 0.5
30.0	26.30 +03	27.5 1.4	24.07 +01	52.3 1.1	51.27 -05	73.5 2.8	28.09 +01	56.0 0.2
Apr. 9.0	26.35 +08	26.2 -1.2	24.10 +05	51.0 +1.3	51.28 +07	70.7 -2.7	28.12 +05	55.8 -0.1
19.0	26.46 .13	25.1 0.9	24.17 .09	49.6 1.5	51.41 .19	68.1 2.5	28.19 .09	55.9 +0.2
28.9	26.62 .16	24.3 0.6	24.29 .14	47.9 1.8	51.65 .30	65.6 2.3	28.31 .14	56.2 0.4
May 8.9	26.83 .23	23.8 -0.3	24.45 .18	46.1 2.0	52.02 .41	63.5 1.9	28.48 .18	56.7 0.7
18.9	27.08 .27	23.7 +0.1	24.65 .22	44.1 2.1	52.48 .50	61.8 1.5	28.68 .22	57.6 0.9
28.9	27.37 +31	24.0 +0.5	24.88 +25	42.0 +2.1	53.02 +58	60.5 -1.0	28.92 +25	58.7 +1.2
June 7.8	27.69 .33	24.7 0.9	25.15 .28	39.8 2.2	53.64 .64	59.7 -0.5	29.19 .28	60.0 1.4
17.8	28.03 .35	25.7 1.2	25.43 .29	37.6 2.1	54.31 .68	59.4 0.0	29.48 .30	61.6 1.4
27.8	28.39 .36	27.0 1.5	25.74 .31	35.5 2.1	55.01 .71	59.6 +0.5	29.79 .31	63.2 1.7
July 7.8	28.75 .35	28.7 1.8	26.05 .31	33.5 1.9	55.72 .71	60.3 1.0	30.11 .31	65.1 1.9
17.7	29.10 +34	30.6 +2.0	26.35 +30	31.6 +1.8	56.43 +70	61.5 +1.5	30.42 +31	67.0 +1.9
27.7	29.43 .38	32.7 2.2	26.65 .29	30.0 1.5	57.11 .67	63.2 1.9	30.73 .30	68.9 1.9
Aug. 6.7	29.74 .30	35.0 2.3	26.94 .27	28.6 1.3	57.76 .63	65.3 2.3	31.02 .28	70.8 1.9
16.6	30.03 .27	37.4 2.4	27.20 .25	27.4 1.0	58.37 .57	67.8 2.6	31.29 .25	72.6 1.8
26.6	30.28 .23	39.8 2.4	27.43 .22	26.6 0.7	58.91 .51	70.5 2.9	31.53 .23	74.3 1.6
Sept. 5.6	30.50 +20	42.2 +2.4	27.63 +19	26.1 +0.3	59.38 +43	73.6 +3.2	31.74 +20	75.9 +1.5
15.6	30.67 .16	44.6 2.3	27.80 .15	26.0 0.0	59.77 .35	76.8 3.3	31.92 .16	77.3 1.3
25.5	30.81 .12	46.9 2.2	27.94 .12	26.1 -0.2	60.08 .27	80.3 2.4	32.06 .13	78.5 1.8
Oct. 5.5	30.91 .08	49.0 2.1	28.04 .08	26.5 0.5	60.31 .18	83.7 2.4	32.18 .10	79.5 2.2
15.5	30.97 .04	51.0 1.9	28.11 .05	27.1 0.7	60.44 +09	87.1 2.4	32.26 .07	80.3 0.7
25.5	30.99 +01	52.8 +1.7	28.15 +02	27.9 -0.9	60.49 .00	90.5 +2.3	32.31 +02	80.9 +0.5
Nov. 4.4	30.98 -03	54.4 1.5	28.15 -01	28.9 1.0	60.44 -09	93.8 2.1	32.33 +01	81.3 0.3
14.4	30.94 .06	55.8 1.2	28.13 .03	29.9 1.1	60.30 .18	96.8 2.9	32.32 -02	81.5 +0.1
24.4	30.87 .08	56.8 0.9	28.09 .06	31.0 1.1	60.07 .27	99.5 2.5	32.29 .05	81.6 -0.2
Dec. 4.3	30.77 .11	57.5 0.6	28.02 .08	32.0 1.0	59.76 .34	101.8 2.1	32.23 .07	81.5 0.2
14.3	30.65 -12	58.0 +0.2	27.94 -09	33.0 -1.0	59.38 -41	103.7 +1.6	32.15 -09	81.3 -0.2
24.3	30.51 .15	58.1 -0.1	27.83 .11	34.0 0.9	58.95 .47	105.1 1.1	32.05 .11	80.9 0.4
34.3	30.35 -16	57.8 -0.4	27.72 -12	34.8 -0.8	58.44 -53	105.9 +0.5	31.94 -12	80.4 -0.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Eridani. (Achernar.)		$\epsilon$ Piscium.		$\beta$ Arietis.		50 Cassiopeiæ.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 1 33	—57° 47'	<sup>h</sup> <sup>m</sup> 1 39	+ 8° 35'	<sup>h</sup> <sup>m</sup> 1 48	+20° 15'	<sup>h</sup> <sup>m</sup> 1 53	+71° 52'
Jan. 0.3	<sup>s</sup> 31.65 —.32	106.2 —0.8	<sup>s</sup> 28.40 —.11	31.0 —0.6	<sup>s</sup> 26.94 —.19	34.5 —0.3	<sup>s</sup> 54.17 —.53	53.9 +1.2
10.3	31.32 .33	106.7 —0.2	28.28 .12	30.4 0.6	26.81 .13	34.1 0.5	53.61 .58	54.8 +0.6
20.2	30.99 .33	106.5 +0.4	28.15 .13	29.7 0.6	26.67 .14	33.5 0.6	53.01 .61	55.1 0.0
30.2	30.67 .32	105.8 1.0	28.02 .14	29.1 0.6	26.52 .15	32.8 0.7	52.38 .62	54.8 —0.6
Feb. 9.2	30.36 .30	104.5 1.5	27.88 .13	28.5 0.6	26.37 .15	32.0 0.8	51.76 .60	54.0 1.1
19.2	30.07 —.27	102.8 +2.0	27.75 —.12	27.9 —0.5	26.23 —.14	31.2 —0.9	51.18 —.56	52.6 —1.6
29.1	29.82 .32	100.6 2.4	27.64 .10	27.4 0.4	26.10 .12	30.3 0.9	50.65 .48	50.8 2.0
Mar. 10.1	29.61 .18	98.0 2.8	27.55 .08	27.0 0.3	25.99 .09	29.4 0.8	50.21 .39	48.5 2.4
20.1	29.45 .13	95.0 3.1	27.48 .04	26.8 —0.1	25.91 .06	28.6 0.7	49.87 .28	46.0 2.6
30.0	29.36 —.06	91.8 3.3	27.46 —.01	26.8 +0.1	25.87 —.02	27.9 0.6	49.65 .16	43.3 2.7
Apr. 9.0	29.32 .00	88.4 +3.5	27.47 +.04	27.0 +0.3	25.88 +.03	27.4 —0.4	49.56 —.02	40.5 —2.8
19.0	29.36 +.07	84.8 3.6	27.53 .06	27.4 0.5	25.93 .07	27.1 —0.2	49.60 +.11	37.8 2.7
29.0	29.47 .14	81.2 3.6	27.63 .12	28.0 0.8	26.03 .12	27.0 +0.1	49.79 .25	35.2 2.5
May 8.9	29.65 .21	77.6 3.5	27.78 .17	28.9 1.0	26.17 .17	27.2 0.3	50.10 .37	32.8 2.2
18.9	29.89 .28	74.2 3.4	27.96 .21	30.0 1.2	26.36 .21	27.7 0.6	50.53 .49	30.8 1.9
28.9	30.20 +.34	70.9 +3.2	28.19 +.24	31.4 +1.4	26.60 +.25	28.4 +0.9	51.07 +.58	29.1 —1.4
June 7.9	30.56 .39	67.8 2.9	28.45 .27	32.9 1.6	26.86 .28	29.4 1.1	51.70 .67	27.9 1.9
17.8	30.97 .43	65.1 2.5	28.73 .29	34.6 1.7	27.15 .30	30.7 1.3	52.40 .73	27.2 —0.5
27.8	31.42 .46	62.8 2.1	29.03 .30	36.4 1.8	27.46 .32	32.1 1.5	53.16 .77	27.0 +0.1
July 7.8	31.90 .48	61.0 1.6	29.34 .31	38.3 1.9	27.78 .32	33.7 1.7	53.94 .79	27.2 0.6
17.7	32.38 +.48	59.7 +1.1	29.65 +.31	40.2 +1.9	28.10 +.32	35.5 +1.8	54.73 +.79	28.0 +1.6
27.7	32.86 .47	58.9 +0.5	29.95 .30	42.0 1.8	28.42 .31	37.3 1.8	55.52 .79	29.2 1.5
Aug. 6.7	33.33 .45	58.6 —0.1	30.24 .28	43.8 1.7	28.72 .29	39.2 1.9	56.28 .74	30.9 1.9
16.7	33.77 .42	59.0 0.6	30.51 .26	45.4 1.6	29.01 .27	41.0 1.8	57.00 .69	33.0 2.3
26.6	34.17 .38	59.9 1.2	30.76 .23	46.9 1.4	29.27 .25	42.8 1.7	57.67 .63	35.4 2.6
Sept. 5.6	34.52 +.22	61.3 —1.7	30.98 +.20	48.1 +1.2	29.50 +.22	44.5 +1.6	58.27 +.56	38.2 +2.9
15.6	34.81 .26	63.3 2.1	31.16 .17	49.2 1.0	29.71 .19	46.1 1.5	58.79 .48	41.3 3.1
25.6	35.04 .19	65.6 2.5	31.32 .14	50.1 0.7	29.88 .16	47.5 1.4	59.23 .40	44.5 3.3
Oct. 5.5	35.20 .12	68.2 2.7	31.45 .11	50.7 0.5	30.02 .12	48.8 1.2	59.58 .30	47.8 3.4
15.5	35.28 +.05	71.0 2.9	31.54 .08	51.1 0.3	30.12 .09	49.9 1.0	59.83 .20	51.3 3.4
25.5	35.30 —.02	74.1 —2.9	31.60 +.05	51.3 +0.1	30.21 +.06	50.8 +0.2	59.99 +.10	54.7 +3.4
Nov. 4.5	35.25 .08	76.9 2.8	31.64 +.02	51.4 0.0	30.25 +.03	51.5 0.6	60.03 —.01	58.1 2.2
14.4	35.14 .14	79.7 2.7	31.64 —.01	51.3 —0.2	30.27 .00	52.1 0.5	60.97 .10	61.2 3.1
24.4	34.97 .19	82.2 2.4	31.62 .03	51.0 0.3	30.25 —.03	52.5 0.3	59.80 .22	64.2 2.6
Dec. 4.4	34.75 .24	84.4 2.0	31.57 .06	50.6 0.4	30.21 .06	52.7 +0.1	59.53 .21	66.9 2.5
14.3	34.50 —.27	86.1 —1.5	31.51 —.08	50.2 —0.5	30.14 —.08	52.7 —0.1	59.18 —.40	69.1 +2.0
24.3	34.20 .30	87.4 1.0	31.42 .10	49.6 0.6	30.05 .10	52.6 0.2	58.72 .49	70.9 1.5
34.3	33.89 —.28	88.2 —0.4	31.31 —.12	49.0 —0.6	29.94 —.12	52.3 —0.3	58.20 —.56	72.2 +1.0



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Ceti.		$\alpha$ Ceti.		48 Cephei (H.)		$\zeta$ Arietis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 2 <sup>m</sup> 37	+ <sup>°</sup> 2 <sup>'</sup> 45	<sup>h</sup> 2 <sup>m</sup> 56	+ <sup>°</sup> 3 <sup>'</sup> 38	<sup>h</sup> 3 <sup>m</sup> 6	+ <sup>°</sup> 77 <sup>'</sup> 19	<sup>h</sup> 3 <sup>m</sup> 8	+ <sup>°</sup> 20 <sup>'</sup> 37
Jan. 0.3	29.73 <sup>a</sup> -0.09	39.2 <sup>a</sup> -0.8	25.48 <sup>a</sup> -0.08	50.7 <sup>a</sup> -0.7	11.12 <sup>a</sup> -0.00	25.8 <sup>a</sup> +2.2	27.97 <sup>a</sup> -0.08	39.5 <sup>a</sup> -0.1
10.3	29.63 .11	38.5 0.7	25.39 .11	50.0 0.7	10.45 .73	27.7 1.7	27.87 .11	39.4 0.2
20.3	29.50 .13	37.9 0.6	25.27 .13	49.3 0.6	9.67 .89	29.1 1.1	27.75 .13	39.2 0.3
30.3	29.36 .14	37.3 0.5	25.13 .14	48.8 0.5	8.80 .89	29.9 +0.5	27.61 .15	38.9 0.4
Feb. 9.2	29.21 .15	36.8 0.4	24.98 .15	48.3 0.4	7.89 .99	30.1 -0.1	27.44 .17	38.4 0.5
19.2	29.06 -0.15	36.5 -0.3	24.82 -0.15	47.9 -0.3	6.97 -0.91	29.7 -0.7	27.27 -0.17	37.9 -0.5
29.2	28.92 .14	36.2 -0.1	24.67 .15	47.7 -0.2	6.07 .86	28.8 1.2	27.10 .17	37.4 0.6
Mar. 10.2	28.78 .19	36.2 0.0	24.53 .13	47.6 0.0	5.24 .77	27.3 1.7	26.94 .15	36.8 0.6
20.1	28.67 .09	36.2 +0.2	24.40 .11	47.6 +0.1	4.52 .66	25.4 2.1	26.80 .13	36.2 0.6
30.1	28.60 .06	36.5 0.4	24.31 .08	47.9 0.3	3.93 .51	23.2 2.4	26.69 .09	35.7 0.5
Apr. 9.1	28.55 -0.02	37.0 +0.6	24.25 -0.04	48.3 +0.5	3.50 -0.34	20.6 -2.6	26.62 -0.06	35.2 -0.4
19.0	28.55 +0.02	37.7 0.8	24.23 .00	48.9 0.7	3.26 -0.15	17.9 2.8	26.59 -0.01	34.9 0.3
29.0	28.60 .07	38.6 1.0	24.26 +0.06	49.7 0.9	3.20 +0.03	15.1 2.8	26.61 +0.04	34.7 -0.1
May 9.0	28.68 .11	39.7 1.2	24.33 .09	50.7 1.1	3.33 .99	12.4 2.7	26.68 .09	34.7 +0.1
19.0	28.62 .15	41.0 1.4	24.44 .14	52.0 1.3	3.65 .41	9.8 2.5	26.80 .14	34.9 0.3
28.9	28.99 +0.19	42.5 +1.6	24.60 +0.18	53.4 +1.5	4.14 +0.57	7.4 -2.2	26.96 +0.18	35.3 +0.6
June 7.9	29.20 .23	44.2 1.7	24.80 .22	55.0 1.6	4.80 .72	5.3 1.9	27.16 .22	36.0 0.7
17.9	29.45 .26	45.9 1.8	25.03 .26	56.6 1.7	5.59 .86	3.6 1.6	27.41 .26	36.8 0.9
27.9	29.72 .26	47.7 1.8	25.30 .27	58.4 1.8	6.50 .96	2.4 1.1	27.68 .26	37.8 1.1
July 7.8	30.01 .29	49.6 1.8	25.58 .29	60.2 1.8	7.51 1.04	1.5 0.6	27.97 .30	39.0 1.2
17.8	30.31 +0.30	51.4 +1.8	25.87 +0.30	62.0 +1.7	8.58+1.00	1.2 -0.1	28.28 +0.31	40.3 +1.3
27.8	30.61 .30	53.2 1.7	26.17 .30	63.6 1.6	9.69 1.12	1.3 +0.3	28.60 .30	41.6 1.4
Aug. 6.7	30.91 .29	54.8 1.5	26.47 .30	65.2 1.5	10.62 1.12	1.8 0.8	28.92 .31	43.1 1.4
16.7	31.20 .28	55.2 1.3	26.76 .30	66.7 1.3	11.94 1.11	2.9 1.2	29.23 .31	44.5 1.4
26.7	31.47 .26	57.4 1.1	27.04 .27	67.9 1.1	13.03 1.07	4.3 1.7	29.53 .29	45.9 1.4
Sept. 5.7	31.72 +0.24	58.4 +0.8	27.31 +0.25	68.9 +0.9	14.08+1.01	6.2 +2.1	29.82 +0.27	47.2 +1.3
15.6	31.95 .22	59.1 0.5	27.55 .23	69.6 0.6	15.06 .93	8.5 2.4	30.08 .25	48.5 1.2
25.6	32.15 .19	59.6 0.3	27.77 .21	70.1 0.4	15.95 .84	11.1 2.7	30.32 .23	49.6 1.1
Oct. 5.6	32.33 .16	59.8 +0.1	27.96 .18	70.3 +0.1	16.74 .73	14.0 3.0	30.54 .20	50.6 1.0
15.6	32.48 .13	59.8 -0.1	28.13 .15	70.3 -0.1	17.41 .61	17.1 3.2	30.73 .18	51.5 0.8
25.5	32.60 +0.10	59.6 -0.3	28.26 +0.12	70.1 -0.3	17.96 +0.47	20.3 +3.3	30.90 +0.15	52.3 +0.7
Nov. 4.5	32.69 .07	59.2 0.5	28.37 .10	69.7 0.5	18.35 .39	23.7 3.4	31.03 .12	52.9 0.6
14.5	32.75 .06	58.6 0.6	28.45 .06	69.2 0.6	18.59 +0.16	27.1 3.4	31.13 .09	53.4 0.4
24.4	32.78 +0.08	58.0 0.7	28.50 +0.03	68.6 0.7	18.67 -0.01	30.4 3.3	31.20 .05	53.8 0.3
Dec. 4.4	32.78 -0.01	57.3 0.7	28.52 .00	67.9 0.7	18.57 .18	33.6 3.1	31.23 +0.02	54.1 0.2
14.4	32.75 -0.04	56.5 -0.7	28.51 -0.03	67.1 -0.7	18.31 -0.34	36.6 +2.8	31.23 -0.02	54.2 +0.1
24.4	32.69 .07	55.8 0.7	28.46 .06	66.4 0.7	17.88 .50	39.2 2.4	31.20 .05	54.3 0.0
34.3	32.61 -0.09	55.1 -0.7	28.39 -0.09	65.7 -0.7	17.30 -0.65	41.4 2.0	31.13 -0.08	54.3 -0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Persei.		$\epsilon$ Eridani.		$\delta$ Persei.		$\eta$ Tauri.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 3 <sup>m</sup> 16	+49° 27'	<sup>h</sup> 3 <sup>m</sup> 27	— 9° 50'	<sup>h</sup> 3 <sup>m</sup> 34	+47° 25'	<sup>h</sup> 3 <sup>m</sup> 40	+23° 45'
Jan. 0.4	20.35 <sup>s</sup> -13	44.8 +1.9	39.37 <sup>s</sup> -08	28.1 -1.3	57.77 <sup>s</sup> -10	44.0 +1.9	49.87 <sup>s</sup> -05	25.0 +0.1
10.3	20.19 .18	45.8 0.8	39.28 .10	29.2 1.1	57.64 .15	45.1 0.9	49.80 .09	25.1 0.0
20.3	19.99 .98	46.5 0.5	39.16 .13	30.2 0.9	57.47 .19	45.8 0.6	49.69 .13	25.1 -0.1
30.3	19.76 .95	46.8 +0.1	39.02 .14	30.9 0.6	57.25 .23	46.3 +0.3	49.55 .15	24.9 0.2
Feb. 9.3	19.50 .97	46.8 -0.3	38.86 .15	31.4 0.4	57.01 .25	46.4 -0.1	49.39 .17	24.7 0.3
19.2	19.23 -37	46.3 -0.6	38.69 -17	31.7 -0.1	56.75 -36	46.1 -0.4	49.21 -18	24.4 -0.4
29.2	18.96 .96	45.5 1.0	38.52 .17	31.7 +0.1	56.49 .96	45.5 0.8	49.02 .18	23.9 0.5
Mar. 10.2	18.70 .94	44.4 1.3	38.35 .16	31.4 0.4	56.24 .94	44.6 1.0	48.85 .17	23.4 0.5
20.1	18.48 .90	43.0 1.5	38.20 .14	30.9 0.6	56.01 .91	43.4 1.3	48.68 .15	22.9 0.6
30.1	18.30 -15	41.4 1.6	38.08 .11	30.1 0.9	55.82 .16	42.0 1.5	48.55 .13	22.3 0.5
Apr. 9.1	18.18 -09	39.7 -1.7	37.98 -08	29.1 +1.2	55.68 -11	40.5 -1.6	48.44 -08	21.8 -0.5
19.1	18.11 -03	37.9 1.7	37.93 -03	27.8 1.4	55.60 -05	38.9 1.6	48.39 -03	21.3 0.4
29.0	18.12 +04	36.2 1.7	37.91 +01	26.3 1.6	55.58 +02	37.3 1.6	48.37 +01	20.9 0.3
May 9.0	18.19 .11	34.6 1.5	37.95 .05	24.6 1.8	55.63 .08	35.7 1.5	48.41 .06	20.7 -0.1
19.0	18.33 .17	33.1 1.3	38.02 .10	22.7 2.0	55.74 .14	34.3 1.3	48.50 .11	20.7 0.0
29.0	18.53 +33	31.9 -1.1	38.15 +14	20.6 +2.1	55.91 +31	33.2 -1.1	48.63 +16	20.8 +0.3
June 7.9	18.80 .99	31.0 0.8	38.31 .18	18.4 2.2	56.15 .96	32.2 0.8	48.81 .90	21.1 0.4
17.9	19.11 .94	30.3 0.5	38.51 .22	16.2 2.2	56.44 .31	31.5 0.5	49.03 .94	21.6 0.6
27.9	19.47 .37	30.0 -0.9	38.74 .25	14.0 2.2	56.77 .35	31.1 -0.3	49.29 .37	22.3 0.6
July 7.8	19.86 .40	30.0 +0.9	39.00 .27	11.8 2.1	57.14 .38	31.0 +0.1	49.57 .29	23.2 0.9
17.8	20.27 +42	30.3 +0.5	39.28 +36	9.8 +1.9	57.53 +40	31.2 +0.3	49.88 +31	24.2 +1.9
27.8	20.70 .42	30.9 0.8	39.57 .29	7.9 1.7	57.94 .41	31.7 0.6	50.19 .38	25.3 1.2
Aug. 6.8	21.13 .43	31.9 1.1	39.87 .20	6.3 1.5	58.35 .42	32.5 0.9	50.51 .32	26.4 1.2
16.7	21.56 .42	33.1 1.4	40.16 .22	4.9 1.2	58.77 .41	33.5 1.1	50.83 .29	27.7 1.2
26.7	21.98 .41	34.6 1.6	40.44 .28	3.9 0.9	59.18 .40	34.8 1.3	51.15 .31	28.9 1.2
Sept. 5.7	22.37 +38	36.3 +1.8	40.71 +36	3.2 +0.5	59.57 +38	36.2 +1.5	51.45 +30	30.1 +1.2
15.7	22.74 .36	38.1 1.9	40.97 .25	2.9 +0.1	59.94 .36	37.8 1.7	51.74 .28	31.2 1.1
25.6	23.09 .33	40.1 2.1	41.21 .23	3.0 -0.9	60.30 .34	39.6 1.8	52.01 .26	32.3 1.0
Oct. 5.6	23.40 .29	42.2 2.1	41.42 .20	3.4 0.6	60.62 .31	41.5 1.9	52.28 .24	33.3 0.9
15.6	23.67 .25	44.4 2.2	41.61 .17	4.1 0.9	60.91 .27	43.4 2.0	52.49 .21	34.2 0.8
25.5	23.90 +21	46.6 +2.2	41.77 +15	5.1 -1.1	61.16 +23	45.4 +2.0	52.69 +19	35.0 +0.7
Nov. 4.5	24.09 .17	48.8 2.2	41.90 .12	6.3 1.3	61.37 .19	47.5 2.0	52.86 .16	35.6 0.6
14.5	24.24 .12	51.0 2.1	42.00 .09	7.7 1.4	61.54 .14	49.4 2.0	53.00 .12	36.2 0.6
24.5	24.33 .07	53.1 2.0	42.07 .05	9.1 1.5	61.66 .09	51.4 1.9	53.11 .09	36.8 0.5
Dec. 4.4	24.37 +01	55.1 1.9	42.11 +08	10.6 1.5	61.72 +04	53.2 1.8	53.18 .06	37.2 0.4
14.4	24.35 -04	56.8 +1.7	42.11 -02	12.1 -1.4	61.74 -01	54.9 +1.6	53.21 +01	37.5 +0.3
24.4	24.28 .09	58.4 1.4	42.08 .05	13.5 1.3	61.70 .06	56.4 1.4	53.20 -03	37.8 0.2
34.4	24.16 -14	59.6 +1.1	42.01 -08	14.7 -1.1	61.61 -12	57.7 +1.2	53.15 -06	38.0 +0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ζ Persei.		γ Eridani.		γ Tauri.		ε Tauri.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 3 <sup>m</sup> 47	<sup>°</sup> +31 <sup>'</sup> 32	<sup>h</sup> 3 <sup>m</sup> 52	<sup>°</sup> -13 <sup>'</sup> 49	<sup>h</sup> 4 <sup>m</sup> 13	<sup>°</sup> +15 <sup>'</sup> 21	<sup>h</sup> 4 <sup>m</sup> 22	<sup>°</sup> +18 <sup>'</sup> 55
Jan. 0.4	<sup>s</sup> 5.91 -.06	58.1 +0.5	<sup>s</sup> 48.56 -.06	52.7 -1.5	<sup>s</sup> 25.53 -.02	16.8 -0.2	<sup>s</sup> 4.96 -.01	46.5 -0.1
10.4	5.83 .10	58.5 0.4	48.49 .09	54.1 1.3	25.48 .06	16.5 0.3	4.93 .06	46.4 0.1
20.3	5.71 .13	58.8 +0.2	48.38 .12	55.3 1.0	25.40 .10	16.3 0.3	4.85 .10	46.3 0.1
30.3	5.56 .16	58.9 0.0	48.24 .15	56.2 0.8	25.28 .13	16.0 0.3	4.73 .13	46.2 0.2
Feb. 9.3	5.38 .19	58.8 -0.2	48.08 .17	56.8 0.5	25.13 .16	15.7 0.3	4.58 .16	46.0 0.2
19.3	5.19 -.20	58.6 -0.4	47.90 -.18	57.1 -0.2	24.97 -.17	15.5 -0.3	4.42 -.17	45.8 -0.2
29.2	4.99 .20	58.1 0.5	47.72 .18	57.2 +0.1	24.79 .18	15.2 0.3	4.24 .18	45.6 0.2
Mar. 10.2	4.79 .19	57.5 0.7	47.54 .17	56.9 0.4	24.61 .17	15.0 0.2	4.05 .18	45.3 0.3
20.2	4.61 .17	56.8 0.8	47.38 .16	56.4 0.7	24.44 .16	14.8 0.2	3.88 .16	45.1 0.3
30.1	4.46 .13	56.0 0.8	47.23 .14	55.5 1.0	24.29 .13	14.6 0.1	3.72 .14	44.8 0.2
Apr. 9.1	4.34 -.09	55.1 -0.8	47.12 -.10	54.4 +1.3	24.17 -.10	14.5 -0.1	3.59 -.11	44.6 -0.2
19.1	4.27 -.05	54.3 0.8	47.04 .08	53.0 1.5	24.09 .06	14.5 +0.1	3.50 .07	44.4 -0.1
29.1	4.25 +0.01	53.5 0.7	47.00 -.02	51.4 1.7	24.05 -.02	14.6 0.2	3.45 -.03	44.3 0.0
May 9.0	4.29 .06	52.9 0.6	47.01 +0.03	49.5 1.9	24.05 +0.03	14.8 0.3	3.45 +0.02	44.4 +0.1
19.0	4.37 .11	52.3 0.4	47.06 .08	47.5 2.1	24.10 .07	15.2 0.5	3.50 .07	44.5 0.2
29.0	4.51 +0.16	52.0 -0.3	47.16 +0.12	45.3 +2.2	24.20 +0.12	15.7 +0.6	3.59 +0.11	44.9 +0.4
June 8.0	4.69 .21	51.8 0.0	47.30 .16	43.0 2.3	24.34 .16	16.4 0.8	3.73 .16	45.3 0.5
17.9	4.92 .25	51.9 +0.2	47.48 .20	40.6 2.4	24.53 .20	17.3 0.9	3.90 .20	45.9 0.7
27.9	5.19 .28	52.2 0.4	47.70 .23	38.3 2.3	24.75 .23	18.2 1.0	4.12 .23	46.6 0.8
July 7.9	5.49 .31	52.6 0.6	47.94 .26	36.0 2.2	25.00 .26	19.3 1.1	4.37 .26	47.5 0.9
17.8	5.80 +0.33	53.3 +0.8	48.20 +0.27	33.8 +2.1	25.27 +0.28	20.4 +1.2	4.64 +0.28	48.4 +1.0
27.8	6.14 .34	54.1 0.9	48.49 .29	31.9 1.8	25.56 .29	21.6 1.2	4.93 .30	49.4 1.0
Aug 6.8	6.48 .34	55.1 1.0	48.78 .29	30.1 1.5	25.86 .30	22.7 1.1	5.23 .30	50.5 1.0
16.8	6.82 .34	56.2 1.1	49.08 .29	28.8 1.2	26.16 .30	23.9 1.1	5.54 .31	51.5 1.0
26.7	7.16 .33	57.4 1.2	49.37 .29	27.7 0.8	26.46 .30	24.9 1.0	5.85 .31	52.4 0.9
Sept. 5.7	7.49 +0.32	58.6 +1.3	49.65 +0.28	27.1 +0.5	26.76 +0.29	25.8 +0.9	6.16 +0.30	53.3 +0.8
15.7	7.80 .30	59.9 1.3	49.92 .28	26.8 +0.1	27.05 .28	26.6 0.7	6.45 .29	54.1 0.7
25.7	8.09 .28	61.1 1.2	50.18 .24	27.0 -0.3	27.32 .27	27.3 0.6	6.74 .28	54.8 0.6
Oct. 5.6	8.36 .26	62.3 1.2	50.41 .22	27.5 0.7	27.58 .25	27.8 0.4	7.01 .26	55.4 0.5
15.6	8.61 .23	63.5 1.2	50.62 .20	28.4 1.0	27.82 .23	28.1 0.3	7.26 .24	55.9 0.4
25.6	8.83 +0.20	64.7 +1.1	50.81 +0.17	29.6 -1.3	28.04 +0.20	28.4 +0.2	7.49 +0.22	56.2 +0.3
Nov. 4.5	9.02 .17	65.8 1.1	50.97 .14	31.1 1.5	28.24 .18	28.4 0.0	7.69 .19	56.4 0.2
14.5	9.18 .14	66.9 1.0	51.09 .11	32.7 1.7	28.40 .15	28.4 -0.1	7.87 .16	56.6 0.1
24.5	9.30 .10	67.8 0.9	51.18 .07	34.4 1.8	28.53 .12	28.3 0.2	8.02 .13	56.7 +0.1
Dec. 4.5	9.38 .06	68.8 0.9	51.24 +0.04	36.2 1.8	28.63 .08	29.2 0.2	8.13 .09	56.7 0.0
14.4	9.42 +0.02	69.6 +0.8	51.26 .00	38.0 -1.7	28.70 +0.04	28.0 -0.2	8.20 +0.05	56.8 0.0
24.4	9.41 -.03	70.3 0.6	51.25 -.03	39.6 1.6	28.72 .00	27.8 0.2	8.23 +0.01	56.7 0.0
34.4	9.36 -.07	70.9 +0.5	51.20 -.07	41.1 -1.4	28.70 -.04	27.6 -0.2	8.22 -.03	56.7 0.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Tauri. (Aldebaran.)		$\alpha$ Camelopardalis.		$\epsilon$ Aurigæ.		$\beta$ Orionis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 4 29	<sup>m</sup> +16° 16'	<sup>h</sup> 4 42	<sup>m</sup> +66° 8'	<sup>h</sup> 4 49	<sup>m</sup> +32° 59'	<sup>h</sup> 4 58	<sup>m</sup> +15° 14'
Jan. 0.4	30.02 -01	53.6 -0.2	56.75 -0.08	63.9 +2.4	42.56 .00	12.2 +0.7	10.58 +0.01	43.2 -0.3
10.4	29.99 .05	53.4 0.2	56.62 .18	66.2 2.2	42.54 -0.04	12.9 0.6	10.57 -0.03	43.0 0.2
20.4	29.91 .09	53.2 0.2	56.39 .97	68.2 1.8	42.47 .09	13.5 0.5	10.51 .07	42.7 0.2
30.3	29.80 .13	53.0 0.2	56.07 .35	69.9 1.4	42.35 .14	14.0 0.4	10.42 .11	42.5 0.2
Feb. 9.3	29.66 .15	52.8 0.2	55.68 .41	71.1 1.0	42.20 .17	14.3 0.3	10.29 .14	42.4 0.2
19.3	29.50 -17	52.6 -0.2	55.24 -46	71.8 +0.5	42.01 -19	14.5 +0.1	10.14 -17	42.2 -0.2
29.2	29.32 .18	52.4 0.2	54.77 .48	72.1 0.0	41.81 .21	14.5 -0.1	9.96 .18	42.0 0.1
Mar. 10.2	29.14 .18	52.1 0.2	54.28 .47	71.9 -0.5	41.60 .21	14.3 0.3	9.78 .18	41.9 0.1
20.2	28.96 .17	51.9 0.2	53.82 .45	71.2 0.9	41.39 .20	14.0 0.4	9.60 .18	41.8 -0.1
30.2	28.81 .14	51.8 0.1	53.39 .40	70.1 1.3	41.20 .18	13.5 0.5	9.43 .16	41.8 0.0
Apr. 9.1	28.68 -12	51.6 -0.1	53.02 -33	68.5 -1.7	41.03 -15	12.9 -0.6	9.28 -13	41.8 0.0
19.1	28.58 .08	51.6 -0.1	52.73 .25	66.7 1.9	40.90 .10	12.2 0.7	9.16 .10	41.8 +0.1
29.1	28.52 -03	51.7 0.0	52.52 .15	64.7 2.1	40.82 .06	11.5 0.7	9.09 .06	41.9 0.2
May 9.1	28.51 +01	51.8 +0.1	52.42 -05	62.5 2.2	40.79 -01	10.8 0.7	9.05 -01	42.1 0.3
19.0	28.55 .06	52.1 0.2	52.42 +05	60.2 2.3	40.81 +03	10.1 0.6	9.06 +03	42.5 0.4
29.0	28.63 +11	52.6 +0.4	52.52 +15	57.9 -2.2	40.88 +10	9.6 -0.5	9.12 +08	42.9 +0.5
June 8.0	28.76 .15	53.2 0.5	52.72 .25	55.8 2.1	41.01 .15	9.1 0.4	9.22 .12	43.5 0.6
17.9	28.93 .19	53.9 0.7	53.02 .34	53.8 1.9	41.18 .19	8.8 0.2	9.36 .16	44.2 0.7
27.9	29.14 .22	54.7 0.8	53.41 .42	52.0 1.7	41.40 .23	8.6 -0.1	9.54 .20	45.0 0.8
July 7.9	29.38 .25	55.7 0.9	53.87 .50	50.5 1.4	41.65 .27	8.6 +0.1	9.76 .23	45.8 0.9
17.9	29.64 +27	56.7 +1.0	54.40 +55	49.2 -1.1	41.93 +30	8.7 +0.2	10.00 +25	46.8 +0.9
27.8	29.92 .29	57.7 1.0	54.98 .60	48.3 0.7	42.24 .32	9.0 0.3	10.26 .27	47.7 0.9
Aug. 6.8	30.22 .30	58.8 1.0	55.59 .63	47.8 -0.4	42.56 .33	9.4 0.5	10.55 .29	48.6 0.9
16.8	30.52 .30	59.8 1.0	56.24 .65	47.6 0.0	42.90 .34	9.9 0.6	10.84 .29	49.5 0.8
26.8	30.83 .30	60.7 0.9	56.90 .66	47.8 +0.3	43.24 .34	10.5 0.6	11.14 .30	50.3 0.7
Sept. 5.7	31.13 +30	61.6 +0.8	57.57 +66	48.3 +0.7	43.59 +34	11.2 +0.7	11.44 +30	50.9 +0.6
15.7	31.42 .29	62.3 0.7	58.23 .65	49.1 1.0	43.93 .34	11.9 0.7	11.73 .30	51.6 0.5
25.7	31.70 .28	62.9 0.5	58.87 .63	50.3 1.4	44.26 .33	12.6 0.8	12.03 .29	52.0 0.3
Oct. 5.6	31.97 .26	63.3 0.4	59.49 .60	51.9 1.7	44.58 .31	13.4 0.8	12.31 .27	52.3 0.2
15.6	32.22 .24	63.6 0.2	60.07 .56	53.7 1.9	44.88 .29	14.2 0.8	12.58 .26	52.4 +0.1
25.6	32.46 +22	63.8 +0.1	60.60 +50	55.7 +2.2	45.16 +27	15.0 +0.8	12.83 +24	52.4 -0.1
Nov. 4.6	32.67 .20	63.9 0.0	61.08 .44	58.0 2.4	45.42 .25	15.8 0.8	13.06 .22	52.3 0.2
14.5	32.85 .17	63.8 -0.1	61.48 .37	60.5 2.6	45.65 .22	16.6 0.8	13.27 .19	52.1 0.2
24.5	33.00 .13	63.7 0.1	61.81 .28	63.1 2.6	45.85 .18	17.4 0.8	13.45 .16	51.8 0.3
Dec. 4.5	33.12 .10	63.6 0.2	62.04 .19	65.8 2.7	46.00 .13	18.3 0.8	13.59 .13	51.5 0.3
14.5	33.20 +06	63.4 -0.2	62.18 +09	68.5 +2.7	46.12 +09	19.1 +0.8	13.70 +09	51.2 -0.3
24.4	33.23 +22	63.2 0.2	62.22 -02	71.1 2.5	46.16 +04	19.9 0.8	13.77 +04	51.0 0.3
34.4	33.23 -02	63.1 -0.2	62.16 -12	73.6 +2.3	46.19 -01	20.7 +0.7	13.79 .00	50.7 -0.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	<i><math>\alpha</math> Aurigæ. (Capella.)</i>			<i><math>\beta</math> Orionis. (Rigel.)</i>			<i><math>\beta</math> Tauri.</i>			Groombridge 966.		
	Right Ascension.		Declination North.	Right Ascension.		Declination South.	Right Ascension.		Declination North.	Right Ascension.		Declination North.
	h	m		h	m		h	m		h	m	
	5	8	+45° 52'	5	9	— 8° 19'	5	19	+28° 30'	5	24	+74° 57'
Jan. 0.4	25.74	+02	55.6 +1.5	9.85	+01	64.4 —1.6	13.26	+04	37.3 +0.5	48.77	—02	62.0 +2.9
10.4	25.72	—04	57.0 1.4	9.83	—03	65.9 1.4	13.27	—01	37.8 0.5	48.66	.19	64.9 2.7
20.4	25.65	.10	58.3 1.2	9.78	.08	67.2 1.2	13.23	.06	38.3 0.4	48.39	.34	67.5 2.5
30.4	25.52	.16	59.4 1.0	9.68	.11	68.3 1.0	13.15	.11	38.7 0.4	47.97	.49	69.8 2.1
Feb. 9.3	25.34	.30	60.3 0.7	9.55	.14	69.2 0.7	13.02	.15	39.0 0.3	47.42	.60	71.7 1.7
19.3	25.12	—23	60.8 +0.4	9.39	—17	69.8 —0.5	12.85	—18	39.3 +0.2	46.76	—02	73.1 +1.2
29.3	24.87	.26	61.2 +0.2	9.22	.18	70.2 —0.2	12.67	.19	39.4 +0.1	46.03	.75	74.0 0.6
Mar. 10.2	24.60	.26	61.1 —0.2	9.03	.19	70.3 0.0	12.46	.20	39.4 —0.1	45.26	.77	74.4 +0.1
20.2	24.34	.25	60.8 0.4	8.84	.18	70.1 +0.3	12.26	.20	39.2 0.2	44.49	.76	74.2 —0.4
30.2	24.10	.23	60.2 0.7	8.67	.17	69.7 0.5	12.07	.18	39.0 0.3	43.75	.71	73.5 0.9
Apr. 9.2	23.88	—20	59.4 —0.9	8.51	—14	69.1 +0.8	11.90	—16	38.7 —0.3	43.07	—03	72.3 —1.4
19.1	23.71	.15	58.4 1.1	8.38	.11	68.2 1.0	11.76	.12	38.3 0.4	42.49	.52	70.7 1.8
29.1	23.58	.10	57.2 1.2	8.29	.07	67.0 1.2	11.66	.08	37.9 0.4	42.03	.40	68.7 2.1
May 9.1	23.52	—04	55.9 1.3	8.23	—03	65.7 1.4	11.60	—03	37.4 0.4	41.70	.25	66.5 2.4
19.1	23.51	+02	54.6 1.3	8.22	+01	64.2 1.6	11.59	+02	37.0 0.4	41.52	—10	64.0 2.5
29.0	23.56	+09	53.3 —1.3	8.25	+05	62.5 +1.8	11.63	+06	36.7 —0.3	41.49	+05	61.4 —2.6
June 8.0	23.68	.14	52.0 1.2	8.32	.09	60.6 1.2	11.72	.11	36.4 0.2	41.63	.21	58.8 2.6
18.0	23.85	.20	50.9 1.1	8.44	.13	58.6 2.0	11.86	.16	36.3 —0.1	41.91	.35	56.3 2.5
27.9	24.08	.25	49.9 0.9	8.59	.17	56.6 2.0	12.04	.20	36.2 0.0	42.33	.49	53.9 2.3
July 7.9	24.35	.30	49.1 0.7	8.77	.20	54.7 2.0	12.25	.23	36.3 +0.1	42.89	.61	51.7 2.1
17.9	24.67	+33	48.5 —0.5	8.99	+33	52.7 +1.9	12.50	+36	36.4 +0.0	43.56	+72	49.7 —1.8
27.9	25.02	.36	48.0 0.3	9.23	.26	50.9 1.7	12.78	.29	36.7 0.3	44.33	.82	48.1 1.5
Aug. 6.8	25.39	.38	47.8 —0.1	9.49	.27	49.2 1.5	13.08	.30	37.0 0.3	45.19	.89	46.7 1.2
16.8	25.78	.39	47.8 +0.1	9.76	.28	47.8 1.3	13.39	.32	37.3 0.4	46.12	.95	45.8 0.8
26.8	26.18	.40	47.9 0.2	10.04	.28	46.7 1.0	13.71	.32	37.8 0.4	47.10	.99	45.2 —0.4
Sept. 5.8	26.58	+41	48.3 +0.4	10.33	+38	45.9 +0.6	14.04	+33	38.2 +0.4	48.10	1.02	45.0 0.0
15.7	26.99	.40	48.8 0.6	10.61	.28	45.4 +0.2	14.37	.33	38.6 0.4	49.13	1.02	45.2 +0.4
25.7	27.39	.40	49.4 0.8	10.89	.27	45.3 —0.1	14.69	.32	39.0 0.4	50.15	1.01	45.7 0.8
Oct. 5.7	27.78	.38	50.3 0.9	11.16	.26	45.6 0.5	15.01	.31	39.5 0.4	51.15	.98	46.7 1.2
15.6	28.16	.36	51.3 1.0	11.42	.25	46.3 0.6	15.32	.30	39.9 0.4	52.11	.93	48.1 1.6
25.6	28.51	+34	52.4 +1.2	11.66	+23	47.2 —1.1	15.01	+28	40.2 +0.4	53.02	+87	49.9 +1.9
Nov. 4.6	28.84	.31	53.6 1.3	11.88	.21	48.5 1.4	15.89	.27	40.6 0.4	53.85	.78	51.9 2.2
14.6	29.13	.27	55.0 1.4	12.08	.18	50.0 1.5	16.14	.23	41.0 0.4	54.58	.67	54.3 2.5
24.5	29.38	.24	56.4 1.5	12.25	.15	51.6 1.7	16.36	.20	41.4 0.4	55.19	.55	57.0 2.7
Dec. 4.5	29.59	.18	58.0 1.5	12.39	.12	53.3 1.7	16.54	.16	41.9 0.5	55.67	.41	59.8 2.9
14.5	29.74	+12	59.5 +1.6	12.49	+08	55.0 —1.7	16.68	+12	42.4 +0.5	56.01	+25	62.8 +3.0
24.5	29.83	+06	61.1 1.5	12.55	+04	56.7 1.6	16.77	.07	42.8 0.5	56.18	+09	65.8 3.0
34.4	29.86	.00	62.6 +1.4	12.56	.00	58.2 —1.5	16.82	+03	43.4 +0.5	56.18	—07	68.7 +2.8



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Orionis.		$\alpha$ Leporis.		$\epsilon$ Orionis.		$\alpha$ Columba.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 5 <sup>m</sup> 26	— 0° 22'	<sup>h</sup> 5 <sup>m</sup> 27	— 17° 54'	<sup>h</sup> 5 <sup>m</sup> 30	— 1° 16'	<sup>h</sup> 5 <sup>m</sup> 35	— 34° 7'
Jan. 0.4	17.60 +.03	66.9 — 1.9	48.10 +.01	21.7 — 2.1	32.34 +.03	35.9 — 1.3	36.67 .00	75.2 — 2.9
10.4	17.61 — .01	68.1 1.1	48.09 — .03	23.7 1.9	32.35 — .01	37.1 1.1	36.64 — .06	77.8 2.5
20.4	17.58 .06	69.1 0.9	48.04 .07	25.5 1.6	32.32 .05	38.2 1.0	36.56 .10	80.2 2.2
30.4	17.50 .10	70.0 0.8	47.95 .11	27.0 1.4	32.24 .09	39.1 0.8	36.43 .15	82.2 1.8
Feb. 9.3	17.38 .13	70.6 0.6	47.81 .15	28.2 1.1	32.13 .13	39.8 0.6	36.26 .19	83.9 1.4
19.3	17.24 — .16	71.1 — 0.4	47.65 — .18	29.1 — 0.7	31.99 — .16	40.3 — 0.4	36.06 — .22	85.1 — 1.0
29.3	17.07 .17	71.5 — 0.2	47.46 .19	29.7 — 0.4	31.82 .17	40.7 0.2	35.83 .24	85.9 0.6
Mar. 10.3	16.89 .18	71.6 0.0	47.26 .20	29.9 0.0	31.64 .18	40.8 — 0.1	35.58 .24	86.2 — 0.1
20.2	16.71 .18	71.5 +0.1	47.06 .20	29.8 +0.3	31.46 .18	40.8 +0.1	35.34 .24	86.1 +0.3
30.2	16.53 .17	71.3 0.3	46.86 .18	29.3 0.6	31.28 .17	40.5 0.3	35.10 .23	85.5 0.8
Apr. 9.2	16.37 — .15	70.9 +0.5	46.69 — .16	28.5 +0.9	31.12 — .15	40.1 +0.5	34.87 — .21	84.5 +1.9
19.2	16.24 .12	70.3 0.7	46.53 .14	27.4 1.2	30.98 .12	39.5 0.7	34.68 .18	83.1 1.6
29.1	16.14 .08	69.5 0.9	46.41 .10	26.0 1.5	30.88 .09	38.7 0.9	34.51 .14	81.3 1.9
May 9.1	16.08 — .04	68.6 1.0	46.33 .06	24.4 1.8	30.81 — .05	37.7 1.1	34.39 .10	79.2 2.3
19.1	16.06 .00	67.5 1.2	46.29 — .02	22.5 2.0	30.79 .00	36.6 1.2	34.31 — .05	76.8 2.5
29.0	16.08 +.04	66.2 +1.3	46.29 +.03	20.4 +2.2	30.81 +.04	35.3 +1.4	34.28 .00	74.1 +2.7
June 8.0	16.14 .09	64.9 1.4	46.34 .07	18.1 2.3	30.86 .08	33.9 1.5	34.30 .07	71.3 2.9
18.0	16.25 .13	63.4 1.5	46.43 .11	15.8 2.4	30.97 .12	32.3 1.6	34.37 .09	68.3 3.0
28.0	16.39 .16	61.8 1.6	46.56 .15	13.4 2.4	31.10 .15	30.7 1.6	34.48 .13	65.3 3.0
July 7.9	16.57 .19	60.2 1.6	46.73 .18	11.0 2.3	31.28 .19	29.1 1.6	34.63 .17	62.4 2.9
17.9	16.78 +.22	58.7 +1.5	46.93 +.21	8.7 +2.2	31.48 +.21	27.5 +1.5	34.82 +.21	59.5 +2.7
27.9	17.00 .24	57.2 1.4	47.15 .24	6.5 2.0	31.71 .24	26.0 1.5	35.05 .24	56.9 2.5
Aug. 6.8	17.25 .26	55.8 1.3	47.40 .26	4.6 1.8	31.95 .25	24.6 1.3	35.31 .27	54.5 2.2
16.8	17.52 .27	54.6 1.1	47.67 .27	2.9 1.5	32.22 .27	23.4 1.1	35.59 .29	52.6 1.8
26.8	17.80 .28	53.6 0.9	47.95 .28	1.6 1.1	32.49 .28	22.4 0.9	35.89 .30	51.0 1.3
Sept. 5.8	18.08 +.28	52.9 +0.6	48.23 +.29	0.7 +0.7	32.77 +.28	21.6 +0.6	36.20 +.31	50.0 +0.8
15.7	18.36 .28	52.4 +0.3	48.52 .29	0.3 +0.2	33.05 .28	21.2 +0.3	36.52 .32	49.4 +0.3
25.7	18.65 .28	52.3 0.0	48.81 .28	0.2 — 0.2	33.34 .28	21.1 0.0	36.83 .31	49.5 — 0.3
Oct. 5.7	18.92 .27	52.4 — 0.3	49.09 .28	0.7 0.6	33.62 .27	21.2 — 0.3	37.14 .31	50.0 0.9
15.7	19.19 .26	52.8 0.6	49.36 .27	1.5 1.1	33.89 .26	21.7 0.6	37.44 .29	51.2 1.4
25.6	19.45 +.25	53.5 — 0.8	49.62 +.25	2.8 — 1.4	34.15 +.25	22.4 — 0.9	37.73 +.27	52.8 — 1.9
Nov. 4.6	19.69 .23	54.5 1.0	49.86 .22	4.4 1.8	34.39 .23	23.4 1.1	37.99 .24	54.9 2.3
14.6	19.90 .20	55.6 1.2	50.07 .20	6.3 2.0	34.61 .21	24.6 1.2	38.21 .21	57.4 2.6
24.5	20.09 .17	56.8 1.3	50.25 .17	8.4 2.2	34.80 .18	25.9 1.3	38.41 .17	60.1 2.8
Dec. 4.5	20.25 .14	58.1 1.3	50.40 .13	10.6 2.2	34.96 .14	27.3 1.4	38.56 .13	63.0 2.9
14.5	20.37 +.10	59.5 — 1.3	50.51 +.09	12.9 — 2.2	35.09 +.11	28.7 — 1.4	38.66 +.08	65.9 — 2.9
24.5	20.46 .06	60.7 1.2	50.58 +.04	15.1 2.1	35.17 .06	30.0 1.3	38.72 +.03	68.8 2.8
34.4	20.50 +.02	61.9 — 1.1	50.60 .00	17.1 — 1.9	35.21 +.02	31.3 — 1.2	38.72 — .02	71.5 — 2.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Orionis.		$\gamma$ Orionis.		22 Camelop. (H.)		$\mu$ Geminorum.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 5 49	+ 7° 22'	<sup>h</sup> <sup>m</sup> 6 1	+14° 46'	<sup>h</sup> <sup>m</sup> 6 6	+69° 21'	<sup>h</sup> <sup>m</sup> 6 16	+22° 34'
Jan. 0.5	<sup>s</sup> 7.01 +.09	59.5 -0.8	<sup>s</sup> 11.21 +.07	44.3 -0.4	<sup>s</sup> 32.09 +.12	22.6 +2.7	<sup>s</sup> 11.65 +.09	5.6 0.0
10.4	7.05 +.02	58.7 0.7	11.26 +.02	43.9 0.3	32.15 -.01	25.3 2.6	11.72 +.04	5.6 +0.1
20.4	7.04 -.03	58.1 0.6	11.26 -.02	43.6 0.2	32.08 .13	27.8 2.5	11.73 -.01	5.8 0.2
30.4	6.98 .08	57.5 0.5	11.22 .07	43.4 0.2	31.88 .25	30.2 2.2	11.70 .06	6.0 0.2
Feb. 9.4	6.88 .11	57.1 0.4	11.13 .11	43.3 -.01	31.58 .35	32.3 1.9	11.62 .10	6.3 0.3
19.3	6.75 -.15	56.8 -0.2	11.00 -.14	43.3 0.0	31.18 -.44	34.1 +1.6	11.50 -.14	6.5 +0.2
29.3	6.59 .17	56.6 -0.1	10.84 .17	43.3 0.0	30.70 .50	35.5 1.1	11.34 .17	6.8 0.2
Mar. 10.3	6.41 .18	56.6 0.0	10.67 .18	43.3 0.0	30.17 .54	36.3 0.6	11.16 .18	7.0 0.2
20.3	6.23 .18	56.5 +0.1	10.48 .18	43.4 +0.1	29.62 .55	36.7 +0.1	10.97 .19	7.1 0.1
30.2	6.05 .17	56.7 0.2	10.30 .18	43.4 0.1	29.07 .54	36.5 -0.4	10.78 .19	7.2 +0.1
Apr. 9.2	5.89 -.15	56.9 +0.3	10.13 -.16	43.6 +0.1	28.55 -.50	35.9 -0.8	10.60 -.17	7.3 0.0
19.2	5.75 .13	57.2 0.4	9.98 .13	43.7 0.2	28.08 .43	34.8 1.3	10.44 .15	7.3 0.0
29.1	5.63 .09	57.7 0.5	9.86 .10	43.9 0.2	27.68 .35	33.4 1.6	10.31 .11	7.3 0.0
May 9.1	5.56 .06	58.2 0.6	9.78 .06	44.2 0.3	27.37 .26	31.6 1.9	10.21 .08	7.2 0.0
19.1	5.52 -.01	58.9 0.7	9.74 -.02	44.5 0.3	27.17 .15	29.5 2.2	10.15 -.03	7.2 0.0
29.1	5.53 +.03	59.7 +0.8	9.74 +.02	44.9 +0.4	27.07 -.04	27.2 -2.3	10.14 +.01	7.2 0.0
June 8.0	5.58 .07	60.6 0.9	9.78 .06	45.3 0.5	27.08 +.07	24.9 2.4	10.17 .05	7.2 0.0
18.0	5.67 .11	61.6 1.0	9.85 .10	45.9 0.6	27.21 .18	22.5 2.4	10.25 .10	7.2 +0.1
28.0	5.80 .15	62.7 1.1	9.99 .15	46.5 0.6	27.44 .29	20.1 2.3	10.37 .14	7.3 0.1
July 8.0	5.96 .18	63.8 1.1	10.15 .18	47.1 0.7	27.78 .38	17.9 2.2	10.52 .17	7.4 0.2
17.9	6.16 +.21	64.9 +1.1	10.34 +.21	47.8 +0.7	28.20 +.47	15.7 -2.0	10.71 +.20	7.6 +0.2
27.9	6.38 .23	66.0 1.0	10.56 .23	48.4 0.6	28.72 .55	13.8 1.8	10.93 .23	7.8 0.2
Aug 6.9	6.62 .25	67.0 1.0	10.80 .25	49.1 0.6	29.30 .61	12.1 1.6	11.17 .26	8.0 0.2
16.8	6.88 .27	67.9 0.8	11.06 .27	49.6 0.5	29.95 .67	10.7 1.3	11.44 .28	8.2 0.2
26.8	7.16 .28	68.6 0.7	11.34 .28	50.1 0.4	30.64 .71	9.6 0.9	11.72 .29	8.3 0.1
Sept. 5.8	7.43 +.28	69.2 +0.5	11.63 +.29	50.5 +0.3	31.37 +.75	8.8 -0.6	12.02 +.30	8.4 +0.1
15.8	7.72 .29	69.6 +0.2	11.92 .30	50.8 +0.2	32.13 .76	8.4 -0.2	12.33 .31	8.4 0.0
25.7	8.01 .29	69.7 0.0	12.22 .30	50.8 0.0	32.90 .77	8.4 +0.2	12.64 .31	8.4 -0.1
Oct. 5.7	8.30 .29	69.6 -0.2	12.52 .29	50.8 -0.1	33.67 .77	8.7 0.5	12.96 .29	8.3 0.1
15.7	8.59 .28	69.3 0.4	12.82 .29	50.6 0.3	34.44 .75	9.3 0.8	13.27 .31	8.1 0.2
25.7	8.86 +.27	68.8 -0.6	13.11 +.28	50.2 -0.4	35.18 +.72	10.3 +1.2	13.58 +.30	7.9 -0.2
Nov. 4.6	9.12 .25	68.1 0.7	13.38 .27	49.8 0.5	35.87 .67	11.7 1.6	13.88 .29	7.6 0.3
14.6	9.36 .23	67.3 0.8	13.64 .25	49.2 0.5	36.52 .61	13.5 1.9	14.16 .27	7.4 0.3
24.6	9.58 .20	66.4 0.9	13.88 .22	48.7 0.6	37.09 .53	15.5 2.2	14.42 .25	7.1 0.2
Dec. 4.5	9.76 .17	65.5 0.9	14.08 .19	48.1 0.5	37.57 .43	17.8 2.4	14.65 .21	6.9 0.2
14.5	9.91 +.13	64.5 -0.9	14.25 +.15	47.6 -0.5	37.96 +.33	20.3 +2.6	14.85 +.17	6.8 -0.1
24.5	10.02 .09	63.6 0.9	14.38 .11	47.1 0.4	38.23 .21	22.9 2.7	15.00 .13	6.8 0.0
34.5	10.09 +.04	62.8 -0.8	14.46 +.06	46.7 -0.3	38.37 +.08	25.6 +2.8	15.10 +.08	6.8 +0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Argus. (Canopus.)		$\gamma$ Geminorum.		$\alpha$ Canis Majoris. (Sirius.)		$\epsilon$ Canis Majoris.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 6 <sup>m</sup> 21	<sup>°</sup> —52 <sup>'</sup> 37	<sup>h</sup> 6 <sup>m</sup> 31	<sup>°</sup> +16 <sup>'</sup> 29	<sup>h</sup> 6 <sup>m</sup> 40	<sup>°</sup> —16 <sup>'</sup> 33	<sup>h</sup> 6 <sup>m</sup> 54	<sup>°</sup> —28 <sup>'</sup> 49
Jan. 0.5	29.98 +.01	73.0 —3.3	15.03 +.11	31.4 —0.4	13.60 +.09	55.2 —2.4	14.48 +.08	18.9 —2.9
10.5	29.95 —.07	76.4 3.2	15.11 .06	31.1 0.3	13.66 +.04	57.5 2.2	14.54 +.04	21.7 2.7
20.4	29.85 .13	79.5 3.0	15.14 +.01	30.8 0.2	13.67 —.02	59.5 2.0	14.56 —.01	24.4 2.5
30.4	29.68 .20	82.3 2.6	15.12 —.04	30.7 —0.1	13.63 .06	61.4 1.7	14.51 .07	26.8 2.3
Feb. 9.4	29.45 .25	84.7 2.2	15.06 .09	30.7 0.0	13.55 .10	63.0 1.4	14.42 .11	28.9 1.9
19.4	29.18 —.30	86.7 —1.7	14.95 —.13	30.8 +0.1	13.43 —.14	64.3 —1.1	14.28 —.15	30.7 —1.6
29.3	28.86 .33	88.2 1.2	14.80 .15	30.9 0.1	13.28 .17	65.3 0.8	14.11 .19	32.1 1.2
Mar. 10.3	28.51 .35	89.1 0.7	14.64 .17	31.0 0.2	13.10 .19	65.9 0.5	13.91 .21	33.1 0.8
20.3	28.15 .36	89.6 —0.1	14.45 .18	31.2 0.2	12.90 .20	66.3 —0.2	13.69 .22	33.6 —0.4
30.3	27.79 .36	89.5 +0.3	14.27 .18	31.3 0.2	12.71 .20	66.3 +0.2	13.47 .22	33.8 0.0
Apr. 9.2	27.43 —.34	88.9 +0.8	14.09 —.17	31.5 +0.2	12.52 —.19	65.9 +0.5	13.25 —.21	33.6 +0.4
19.2	27.10 .31	87.8 1.5	13.93 .15	31.7 0.2	12.34 .17	65.3 0.8	13.04 .20	32.9 0.6
29.2	26.81 .28	86.2 1.8	13.80 .12	31.9 0.2	12.18 .14	64.4 1.1	12.85 .17	31.9 1.2
May 9.1	26.55 .23	84.2 2.2	13.69 .08	32.1 0.2	12.06 .11	63.2 1.3	12.69 .14	30.5 1.5
19.1	26.34 .18	81.8 2.6	13.63 —.04	32.3 0.3	11.96 .07	61.8 1.6	12.56 .11	28.8 1.9
29.1	26.09 —.12	79.1 +2.9	13.60 .00	32.6 +0.3	11.90 —.04	60.1 +1.8	12.48 —.07	26.8 +2.1
June 8.1	26.10 —.06	76.1 3.1	13.62 +.04	32.9 0.4	11.89 .00	58.2 1.9	12.43 —.03	24.6 2.3
18.0	26.07 .00	72.9 3.3	13.68 .08	33.3 0.4	11.92 +.04	56.2 2.1	12.42 +.01	22.1 2.5
28.0	26.09 +.06	69.6 3.3	13.78 .11	33.7 0.4	11.98 .08	54.1 2.1	12.45 .05	19.5 2.6
July 5.0	26.18 .12	66.3 3.3	13.91 .15	34.1 0.4	12.08 .11	51.9 2.1	12.53 .09	16.9 2.6
18.0	26.33 +.17	63.0 +3.2	14.08 .18	34.6 +0.4	12.21 +.15	49.8 +2.1	12.64 +.13	14.2 +2.6
27.9	26.53 .23	59.9 3.0	14.29 .21	35.0 0.4	12.37 .18	47.7 2.0	12.79 .16	11.7 2.5
Aug. 6.9	26.78 .27	57.0 2.7	14.50 .23	35.5 0.4	12.57 .21	45.8 1.8	12.97 .20	9.3 2.2
16.9	27.08 .31	54.5 2.3	14.75 .25	35.8 0.3	12.78 .23	44.2 1.5	13.18 .23	7.2 2.0
26.8	27.41 .35	52.4 1.8	15.01 .27	36.1 0.2	13.02 .25	42.8 1.2	13.42 .25	5.4 1.6
Sept. 5.8	27.78 +.38	50.8 +1.3	15.29 +.28	36.2 +0.1	13.28 +.27	41.8 +0.8	13.69 +.27	4.0 +1.2
15.8	28.17 .39	49.8 0.7	15.58 .29	36.3 0.0	13.55 .28	41.1 +0.4	13.97 .29	3.0 0.7
25.8	28.57 .40	49.5 +0.1	15.88 .30	36.2 —0.2	13.84 .29	40.9 0.0	14.26 .30	2.6 +0.2
Oct. 5.7	28.98 .40	49.7 —0.6	16.18 .31	36.0 0.3	14.13 .29	41.1 —0.5	14.57 .31	2.7 —0.3
15.7	29.38 .39	50.6 1.2	16.49 .30	35.6 0.4	14.42 .29	41.8 0.9	14.88 .31	3.3 0.9
25.7	29.76 +.37	52.2 —1.8	16.79 +.30	35.1 —0.5	14.70 +.28	43.0 —1.3	15.19 +.30	4.4 —1.4
Nov. 4.7	30.12 .34	54.2 2.3	17.09 .29	34.6 0.6	14.99 .27	44.4 1.7	15.49 .29	6.0 1.8
14.6	30.44 .30	56.8 2.8	17.37 .27	34.0 0.6	15.25 .25	46.2 2.0	15.78 .27	8.1 2.2
24.6	30.72 .25	59.8 3.1	17.63 .25	33.3 0.6	15.49 .23	48.3 2.2	16.04 .25	10.5 2.5
Dec. 4.6	30.94 .19	63.1 3.3	17.86 .22	32.7 0.6	15.71 .20	50.6 2.3	16.27 .21	12.2 2.8
14.5	31.10 +.12	66.5 —3.5	18.06 +.18	32.2 —0.5	15.89 +.16	53.0 —2.4	16.46 +.17	16.0 —2.9
24.5	31.19 +.05	70.0 3.5	18.22 .14	31.7 0.4	16.03 .19	55.4 2.4	16.61 .19	18.9 2.9
34.5	31.21 —.02	73.4 —3.3	18.34 +.09	31.3 —0.3	16.13 +.07	57.7 —2.3	16.71 +.07	21.8 —2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Canis Majoris.		$\delta$ Geminorum.		Piazzi vii. 67.		$\alpha^2$ Geminorum. (Castor.)	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 7	<sup>m</sup> 3	<sup>h</sup> 7	<sup>m</sup> 13	<sup>h</sup> 7	<sup>m</sup> 19	<sup>h</sup> 7	<sup>m</sup> 27
		<sup>°</sup> 26		<sup>°</sup> 22		<sup>°</sup> 68		<sup>°</sup> 32
Jan. 0.5	51.19 +.08	62.3 -2.8	26.53 +.15	8.5 -0.1	15.10 +.39	26.6 +2.4	27.75 +.18	52.4 +0.4
10.5	51.26 +.04	65.0 2.7	26.66 .10	8.4 0.0	15.36 .19	29.1 2.6	27.90 .13	52.9 0.6
20.5	51.29 .00	67.6 2.5	26.73 +.05	8.5 +0.1	15.48 +.06	31.7 2.6	28.00 .07	53.0 0.7
30.4	51.26 -.05	70.0 2.2	26.76 .00	8.6 0.2	15.48 -.07	34.4 2.6	28.04 +.01	54.4 0.8
Feb. 9.4	51.18 .10	72.1 1.9	26.73 -.05	8.9 0.3	15.35 .18	36.9 2.4	28.02 -.05	55.2 0.9
19.4	51.06 -.14	73.8 -1.6	26.65 -.10	9.3 +0.4	15.11 -.29	39.3 +2.2	27.95 -.10	56.1 +0.9
29.4	50.90 .17	75.2 1.2	26.53 .14	9.7 0.4	14.77 .36	41.3 1.9	27.83 .14	57.0 0.8
Mar. 10.3	50.71 .90	76.2 0.8	26.38 .16	10.1 0.4	14.35 .45	43.0 1.5	27.67 .17	57.8 0.7
20.3	50.51 .21	76.9 -0.4	26.20 .18	10.5 0.4	13.86 .50	44.3 1.0	27.49 .19	58.5 0.6
30.3	50.29 .21	77.1 0.0	26.02 .19	10.9 0.3	13.35 .52	45.1 +0.5	27.29 .20	59.0 0.5
Apr. 9.2	50.08 -.21	76.9 +0.3	25.83 -.18	11.2 +0.3	12.83 -.51	45.3 0.0	27.08 -.20	59.4 +0.3
19.2	49.87 .19	76.4 0.7	25.66 .17	11.4 0.2	12.32 .49	45.1 -0.4	26.89 .18	59.6 +0.1
29.2	49.69 .17	75.4 1.1	25.50 .14	11.6 0.2	11.85 .44	44.5 0.9	26.71 .16	59.7 0.0
May 9.2	49.53 .14	74.2 1.4	25.38 .11	11.7 0.1	11.45 .37	43.4 1.3	26.57 .13	59.6 -0.2
19.1	49.41 .11	72.6 1.7	25.28 .08	11.8 +0.1	11.11 .29	41.9 1.6	26.45 .10	59.4 0.3
29.1	49.32 -.07	70.7 +2.1	25.22 -.04	11.9 0.0	10.87 -.20	40.1 -2.0	26.37 -.06	59.0 -0.5
June 8.1	49.26 -.03	68.6 2.2	25.21 .00	11.9 0.0	10.72 -.10	38.0 2.2	26.34 -.01	58.6 0.5
18.1	49.25 +.01	66.3 2.4	25.22 +.04	11.9 0.0	10.67 .00	35.7 2.4	26.35 +.03	58.0 0.6
28.0	49.28 .05	63.8 2.5	25.29 .08	11.9 0.0	10.72 +.10	33.3 2.5	26.40 .07	57.4 0.6
July 8.0	49.35 .09	61.3 2.5	25.38 .12	11.8 0.0	10.87 .20	30.8 2.5	26.49 .11	56.8 0.6
18.0	49.45 +.12	58.8 +2.5	25.52 +.15	11.8 0.0	11.11 +.30	28.3 -2.5	26.62 +.15	56.1 -0.7
28.0	49.59 .16	56.3 2.4	25.68 .18	11.7 -0.1	11.44 .38	25.8 2.4	26.78 .18	55.5 0.7
Aug. 6.9	49.77 .19	54.0 2.2	25.88 .21	11.6 0.1	11.86 .46	23.5 2.3	26.98 .21	54.8 0.7
16.9	49.97 .22	52.0 1.9	26.10 .23	11.5 0.1	12.36 .53	21.3 2.1	27.21 .24	54.0 0.7
26.9	50.20 .24	50.2 1.6	26.35 .26	11.3 0.2	12.92 .59	19.3 1.9	27.47 .27	53.3 0.7
Sept. 5.8	50.45 +.26	48.8 +1.2	26.61 +.28	11.0 -0.3	13.54 +.64	17.5 -1.6	27.75 +.29	52.6 -0.7
15.8	50.73 .28	47.9 0.7	26.90 .29	10.7 0.4	14.21 .69	16.0 1.3	28.05 .31	51.8 0.8
25.8	51.01 .28	47.5 +0.2	27.20 .31	10.2 0.5	14.92 .72	14.8 1.0	28.37 .33	51.1 0.7
Oct. 5.8	51.31 .30	47.5 -0.3	27.51 .31	9.7 0.6	15.66 .75	14.0 0.7	28.70 .34	50.3 0.7
15.7	51.62 .31	48.1 0.8	27.83 .32	9.1 0.6	16.42 .76	13.5 -0.3	29.05 .35	49.6 0.7
25.7	51.93 +.30	49.2 -1.4	28.15 +.32	8.5 -0.7	17.18 +.76	13.4 +0.1	29.40 +.35	48.9 -0.6
Nov. 4.7	52.23 .29	50.7 1.8	28.47 .32	7.8 0.7	17.93 .74	13.7 0.5	29.76 .35	48.4 0.5
14.6	52.52 .28	52.7 2.1	28.79 .31	7.1 0.8	18.66 .71	14.5 0.9	30.11 .34	47.9 0.4
24.6	52.78 .25	55.0 2.4	29.09 .29	6.5 0.6	19.35 .65	15.6 1.3	30.44 .32	47.6 0.2
Dec. 4.6	53.02 .22	57.6 2.7	29.37 .26	5.9 0.5	19.97 .58	17.1 1.7	30.75 .30	47.4 -0.1
14.6	53.22 +.18	60.3 -2.8	29.61 +.23	5.5 -0.4	20.52 +.49	19.0 +2.0	31.03 +.26	47.4 +0.1
24.5	53.32 .14	63.1 2.8	29.82 .19	5.2 0.3	20.96 .39	21.2 2.3	31.27 .22	47.6 0.3
34.5	53.49 +.09	66.0 -2.8	29.99 +.14	5.0 -0.1	21.30 +.28	23.6 +2.5	31.47 +.16	48.0 +0.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Canis Minoris. (Procyon.)		$\beta$ Geminorum. (Pollux.)		$\phi$ Geminorum.		3 Ursæ Majoris (H.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 7 33	+ <sup>°</sup> <sup>'</sup> 5 30	<sup>h</sup> <sup>m</sup> 7 38	+ <sup>°</sup> <sup>'</sup> 28 17	<sup>h</sup> <sup>m</sup> 7 46	+ <sup>°</sup> <sup>'</sup> 27 3	<sup>h</sup> <sup>m</sup> 8 1	+ <sup>°</sup> <sup>'</sup> 68 47
Jan. 0.5	26.86 +.16	35.7 -1.3	28.19 +.18	37.6 +0.1	38.99 +.19	10.2 0.0	41.14 +.43	58.4 +2.2
10.5	27.00 .11	34.5 1.1	28.35 .13	37.8 0.3	39.16 .14	10.3 +0.2	41.51 .30	60.7 2.4
20.5	27.08 .06	33.5 0.8	28.45 .08	38.2 0.5	39.28 .09	10.6 0.4	41.75 .18	63.3 2.6
30.5	27.11 +.01	32.6 0.6	28.50 +.03	38.7 0.6	39.33 +.03	11.0 0.5	41.86 +.05	66.0 2.7
Feb. 9.4	27.09 -.04	31.9 0.4	28.50 -.03	39.4 0.7	39.34 -.02	11.6 0.6	41.84 -.08	68.6 2.6
19.4	27.03 -.08	31.4 -0.2	28.44 -.08	40.1 +0.7	39.29 -.07	12.3 +0.7	41.70 -.20	71.2 +2.5
29.4	26.92 .12	31.1 -0.1	28.33 .13	40.8 0.7	39.19 .12	13.0 0.7	41.44 .30	73.6 2.2
Mar. 10.4	26.79 .15	30.9 0.0	28.18 .16	41.5 0.7	39.05 .15	13.7 0.7	41.09 .39	75.7 1.9
20.3	26.63 .16	30.9 +0.2	28.01 .18	42.2 0.6	38.89 .17	14.3 0.6	40.66 .45	77.4 1.5
30.3	26.46 .17	31.0 0.3	27.82 .19	42.7 0.5	38.71 .18	14.9 0.5	40.18 .49	78.7 1.0
Apr. 9.3	26.29 -.17	31.2 +0.4	27.63 -.19	43.2 +0.4	38.52 -.19	15.4 +0.4	39.67 -.51	79.5 +0.6
19.2	26.13 .16	31.6 0.5	27.44 .18	43.5 0.2	38.33 .18	15.8 0.3	39.16 .50	79.9 +0.1
29.2	25.97 .14	32.0 0.6	27.27 .16	43.7 +0.1	38.17 .16	16.0 0.2	38.67 .47	79.7 -0.4
May 9.2	25.84 .12	32.5 0.6	27.12 .13	43.8 0.0	38.02 .13	16.1 +0.1	38.22 .42	79.1 0.8
19.2	25.74 .09	33.2 0.7	27.01 .10	43.7 -0.1	37.90 .10	16.2 0.0	37.82 .36	78.0 1.3
29.1	25.67 -.05	33.8 +0.8	26.93 -.06	43.5 -0.2	37.82 -.07	16.1 -0.1	37.50 -.28	76.5 -1.6
June 8.1	25.63 -.02	34.6 0.8	26.89 -.02	43.3 0.3	37.77 -.03	15.9 0.2	37.26 .19	74.7 2.0
18.1	25.63 +.01	35.4 0.9	26.88 +.02	43.0 0.4	37.76 +.01	15.6 0.3	37.11 .10	72.6 2.2
28.0	25.66 .04	36.2 0.9	26.92 .06	42.6 0.4	37.79 .05	15.3 0.3	37.05 -0.1	70.2 2.4
July 8.0	25.73 .08	37.1 0.8	27.00 .09	42.1 0.5	37.86 .09	14.9 0.4	37.10 +0.09	67.7 2.6
18.0	25.83 +.11	37.9 +0.8	27.11 +.13	41.7 -0.5	37.97 +.12	14.5 -0.4	37.23 +.18	65.1 -2.6
28.0	25.96 .14	38.7 0.7	27.26 .16	41.2 0.5	38.10 .15	14.1 0.5	37.45 .27	62.5 2.6
Aug. 6.9	26.12 .17	39.4 0.5	27.44 .19	40.6 0.6	38.28 .19	13.5 0.5	37.77 .36	59.8 2.6
16.9	26.29 .20	40.1 0.3	27.65 .22	40.0 0.6	38.47 .21	13.0 0.6	38.17 .44	57.3 2.5
26.9	26.51 .22	40.5 +0.1	27.88 .25	39.4 0.7	38.70 .24	12.4 0.7	38.64 .51	54.8 2.4
Sept. 5.9	26.73 +.24	40.8 -0.1	28.14 +.27	38.7 -0.7	38.95 +.26	11.7 -0.7	39.19 +.57	52.6 -2.2
15.8	26.99 .26	40.8 0.3	28.43 .29	38.0 0.7	39.23 .29	10.9 0.8	39.79 .63	50.5 1.9
25.8	27.26 .27	40.6 0.6	28.73 .31	37.2 0.8	39.53 .31	10.1 0.8	40.45 .68	48.7 1.6
Oct. 5.8	27.53 .29	40.1 0.8	29.05 .33	36.4 0.8	39.84 .32	9.3 0.9	41.16 .72	47.3 1.3
15.8	27.83 .30	39.4 1.0	29.38 .34	35.6 0.8	40.17 .33	8.4 0.9	41.90 .75	46.1 0.9
25.7	28.13 +.30	38.5 -1.2	29.72 +.34	34.8 -0.8	40.50 +.34	7.6 -0.9	42.66 +.77	45.4 -0.6
Nov. 4.7	28.43 .30	37.4 1.3	30.06 .34	34.1 0.7	40.85 .34	6.7 0.8	43.43 .77	45.0 -0.1
14.7	28.73 .29	36.1 1.4	30.40 .34	33.4 0.6	41.19 .34	5.9 0.7	44.19 .75	45.1 +0.3
24.6	29.02 .27	34.7 1.4	30.73 .32	32.8 0.5	41.52 .32	5.2 0.6	44.93 .71	45.7 0.8
Dec. 4.6	29.28 .25	33.3 1.4	31.04 .30	32.4 0.4	41.83 .30	4.7 0.5	45.62 .66	46.6 1.2
14.6	29.52 +.22	31.8 -1.4	31.32 +.26	32.1 -0.2	42.12 +.27	4.3 -0.3	46.25 +.58	48.1 +1.6
24.6	29.73 .18	30.4 1.3	31.56 .22	32.0 0.0	42.36 .23	4.1 -0.1	46.79 .40	49.9 2.0
34.5	29.89 +.14	29.1 -1.2	31.76 +.17	32.2 +0.2	42.57 +.18	4.1 +0.1	47.23 +.38	52.1 +2.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	15 Argus ( $\iota$ )		$\gamma$ Cancri.		$\epsilon$ Hydræ.		$\epsilon$ Ursæ Majoris.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	$^{\text{h}}$ $^{\text{m}}$ 8 2	$^{\circ}$ $'$ $-23^{\circ} 58'$	$^{\text{h}}$ $^{\text{m}}$ 8 26	$^{\circ}$ $'$ $+20^{\circ} 48'$	$^{\text{h}}$ $^{\text{m}}$ 8 40	$^{\circ}$ $'$ $+6^{\circ} 49'$	$^{\text{h}}$ $^{\text{m}}$ 8 51	$^{\circ}$ $'$ $+48^{\circ} 28'$
Jan. 0.6	$^{\text{s}}$ 47.30 +.19	56.4 -2.8	$^{\text{s}}$ 14.25 +.22	68.5 -0.6	$^{\text{s}}$ 51.04 +.22	40.4 -1.4	$^{\text{s}}$ 32.52 +.33	$^{\text{s}}$ 39.8 +0.8
10.6	47.44 .12	59.1 2.7	14.45 .18	68.1 0.3	51.24 .17	39.1 1.9	32.92 .26	40.8 1.1
20.5	47.53 .06	61.8 2.6	14.61 .12	67.8 -0.1	51.39 .13	37.9 1.0	33.05 .19	42.1 1.4
30.5	47.57 +.01	64.4 2.4	14.70 .07	67.8 +0.1	51.49 .07	37.0 0.8	33.21 .12	43.6 1.7
Feb. 9.5	47.55 -.04	66.6 2.1	14.74 +.02	68.0 0.2	51.54 +.02	36.3 0.6	33.29 +.05	45.4 1.8
19.4	47.49 -.09	68.7 -1.8	14.73 -.03	68.3 +0.4	51.54 -.02	35.8 -0.4	33.30 -.02	47.3 +1.9
29.4	47.38 .13	70.3 1.5	14.67 .08	68.8 0.5	51.50 .06	35.5 -0.2	33.25 .09	49.2 1.9
Mar. 10.4	47.34 .16	71.7 1.2	14.58 .12	69.3 0.6	51.41 .10	35.4 0.0	33.13 .14	51.0 1.8
20.4	47.07 .18	72.7 0.8	14.44 .14	69.9 0.6	51.29 .13	35.4 +0.1	32.96 .19	52.7 1.6
30.3	46.88 .19	73.3 0.4	14.29 .16	70.5 0.6	51.15 .15	35.6 0.2	32.75 .22	54.2 1.3
Apr. 9.3	46.68 -.19	73.6 -0.1	14.12 -.17	71.1 +0.6	51.00 -.15	35.9 +0.3	32.52 -.24	55.4 +1.1
19.3	46.49 .19	73.5 +0.3	13.95 .17	71.7 0.5	50.84 .15	36.3 0.4	32.27 .25	56.3 0.8
29.2	46.30 .18	73.0 0.6	13.79 .16	72.1 0.4	50.69 .15	36.8 0.5	32.02 .24	56.9 +0.4
May 9.2	46.13 .16	72.2 1.0	13.64 .14	72.5 0.3	50.55 .13	37.3 0.6	31.79 .22	57.1 0.0
19.2	45.98 .13	71.1 1.3	13.51 .11	72.8 0.3	50.42 .11	37.9 0.6	31.58 .20	57.0 -0.3
29.2	45.86 -.10	69.7 +1.5	13.41 -.09	73.0 +0.2	50.32 -.09	38.5 +0.6	31.40 -.16	58.5 -0.6
June 8.1	45.77 .07	68.0 1.8	13.34 .05	73.2 +0.1	50.24 .06	39.2 0.7	31.25 .12	55.8 0.9
18.1	45.72 -.04	66.1 2.0	13.30 -.02	73.3 0.0	50.19 -.03	39.8 0.7	31.15 .08	54.7 1.2
28.1	45.70 .00	64.0 2.1	13.30 +0.1	73.3 0.0	50.17 .00	40.5 0.7	31.10 -.04	53.4 1.4
July 8.1	45.71 +.03	61.8 2.2	13.33 .04	73.3 -0.1	50.18 +.03	41.2 0.7	31.08 +.01	51.9 1.6
18.0	45.76 +.06	59.5 +2.3	13.39 +.08	73.1 -0.2	50.22 +.05	41.8 +0.6	31.12 +.06	50.3 -1.8
28.0	45.84 .10	57.3 2.2	13.48 .11	72.9 0.3	50.29 .08	42.4 0.5	31.20 .10	48.4 1.9
Aug. 7.0	45.95 .13	55.1 2.1	13.60 .14	72.6 0.3	50.39 .11	42.9 0.4	31.32 .15	46.5 2.0
16.9	46.10 .16	53.1 1.9	13.76 .17	72.2 0.4	50.52 .14	43.2 0.3	31.49 .19	44.5 2.0
26.9	46.28 .19	51.3 1.6	13.94 .19	71.7 0.6	50.67 .17	43.4 +0.1	31.70 .23	42.4 2.1
Sept. 5.9	46.49 +.22	49.8 +1.3	14.14 +.22	71.1 -0.7	50.85 +.19	43.5 -0.1	31.95 +.27	40.4 -2.1
15.9	46.72 .25	48.7 0.9	14.38 .25	70.3 0.8	51.05 .22	43.3 0.3	32.24 .31	38.3 2.0
25.8	46.98 .27	48.1 +0.4	14.64 .27	69.4 0.9	51.29 .24	42.9 0.5	32.57 .34	36.4 1.9
Oct. 5.8	47.26 .29	47.9 0.0	14.92 .29	68.4 1.0	51.54 .27	42.2 0.8	32.93 .38	34.5 1.8
15.8	47.56 .30	48.2 -0.5	15.22 .31	67.3 1.1	51.82 .29	41.3 1.0	33.33 .41	32.8 1.6
25.8	47.87 +.31	49.0 -1.0	15.54 +.32	66.2 -1.2	52.11 +.30	40.2 -1.2	33.74 +.43	31.2 -1.4
Nov. 4.7	48.18 .31	50.3 1.5	15.86 .33	65.0 1.2	52.42 .31	38.9 1.4	34.18 .44	29.9 1.2
14.7	48.49 .31	52.0 1.9	16.20 .33	63.8 1.2	52.73 .31	37.5 1.5	34.63 .45	28.9 0.9
24.7	48.79 .29	54.0 2.2	16.53 .33	62.6 1.1	53.05 .31	35.9 1.6	35.09 .45	28.2 0.5
Dec. 4.6	49.08 .27	56.5 2.5	16.85 .31	61.5 1.0	53.35 .30	34.3 1.6	35.53 .43	27.8 -0.2
14.6	49.33 +.24	59.1 -2.7	17.15 +.28	60.5 -0.9	53.64 +.27	32.7 -1.6	35.95 +.40	27.9 +0.2
24.6	49.55 .20	61.9 2.8	17.42 .25	59.8 0.7	53.90 .24	31.1 1.5	36.33 .36	28.2 0.6
34.6	49.72 +.15	64.7 -2.8	17.65 +.21	59.2 -0.5	54.13 +.21	29.7 -1.3	36.67 +.31	29.0 +0.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\sigma^3$ Ursæ Majoris.		$\kappa$ Cancri.		$\epsilon$ Argus.		1 Draconis (H.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 9 <sup>m</sup> 0	+67° 34'	<sup>h</sup> 9 <sup>m</sup> 1	+11° 6'	<sup>h</sup> 9 <sup>m</sup> 14	-58° 48'	<sup>h</sup> 9 <sup>m</sup> 20	+81° 48'
Jan. 0.6	32.59 +.53	65.7 +1.6	41.12 +.24	61.7 -1.3	7.55 +.30	9.0 -3.4	66.38+1.33	59.1 +1.9
10.6	33.07 .42	67.5 2.0	41.34 .20	60.5 1.0	7.82 .23	12.5 3.6	67.61 1.10	61.3 2.4
20.5	33.44 .31	69.7 2.4	41.51 .15	59.6 0.8	8.00 .15	16.2 3.7	68.57 .83	63.8 2.7
30.5	33.70 .20	72.2 2.6	41.64 .10	58.8 0.6	8.11 +.06	20.0 3.7	69.26 .53	66.7 3.0
Feb. 9.5	33.83 +.07	74.6 2.7	41.71 +.05	58.4 0.4	8.13 -.02	23.6 3.6	69.63+ .22	69.7 3.1
19.5	33.84 -.05	77.5 +2.7	41.73 .00	58.1 -0.2	8.07 -1.0	27.2 -3.4	69.70- .09	72.9 +3.1
29.4	33.73 .16	80.2 2.6	41.71 -.05	58.0 0.0	7.93 .17	30.5 3.2	69.45 .39	75.9 3.0
Mar. 10.4	33.52 .26	82.7 2.4	41.64 .08	58.1 +0.1	7.73 .23	33.5 2.8	68.92 .66	78.8 2.8
20.4	33.22 .34	84.9 2.1	41.54 .11	58.4 0.3	7.47 .26	36.1 2.4	68.13 .90	81.4 2.4
30.4	32.84 .40	86.8 1.7	41.41 .14	58.7 0.4	7.16 .32	38.3 2.0	67.14 1.08	83.7 2.0
Apr. 9.3	32.41 -.44	88.3 +1.3	41.27 -.15	59.1 +0.5	6.82 -.35	40.1 -1.5	65.97-1.21	85.5 +1.5
19.3	31.95 .46	89.4 0.8	41.12 .15	59.6 0.5	6.46 .37	41.4 1.0	64.69 1.31	86.7 1.0
29.3	31.48 .46	89.9 +0.3	40.97 .15	60.2 0.5	6.09 .37	42.1 -0.5	63.35 1.34	87.4 +0.5
May 9.2	31.03 .44	90.0 -0.2	40.82 .14	60.7 0.5	5.72 .37	42.4 0.0	62.00 1.32	87.5 -0.1
19.2	30.61 .40	89.6 0.6	40.69 .12	61.3 0.5	5.35 .35	42.1 +0.5	60.70 1.26	87.1 0.7
29.2	30.23 -.35	88.8 -1.1	40.59 -.10	61.8 +0.5	5.01 -.33	41.3 +1.0	59.49-1.15	86.1 -1.2
June 8.2	29.91 .29	87.4 1.5	40.50 .07	62.3 0.5	4.69 .30	40.1 1.5	58.40 1.00	84.6 1.7
18.1	29.66 .21	85.8 1.9	40.44 .05	62.8 0.5	4.41 .26	38.4 1.9	57.48 .83	82.7 2.1
28.1	29.48 .13	83.7 2.2	40.41 -.02	63.3 0.4	4.17 .21	36.2 2.3	56.75 .63	80.3 2.5
July 8.1	29.39 -.06	81.4 2.4	40.40 +.01	63.7 0.4	3.98 .17	33.8 2.6	56.22 .42	77.6 2.8
18.1	29.37 +.03	78.9 -2.6	40.42 +.04	64.1 +0.3	3.84 -.11	31.0 +2.9	55.90- .20	74.7 -3.1
28.0	29.44 .11	76.2 2.8	40.48 .07	64.3 0.2	3.76 -.05	28.1 3.0	55.82+ .03	71.5 3.2
Aug. 7.0	29.59 .19	73.4 2.8	40.56 .09	64.5 +0.1	3.74 +.02	25.0 3.1	55.95 .25	68.2 3.3
17.0	29.83 .27	70.5 2.9	40.67 .12	64.6 0.0	3.79 .08	21.9 3.0	56.32 .48	64.9 3.3
26.9	30.14 .35	67.7 2.8	40.80 .15	64.5 -0.2	3.91 .15	18.9 2.9	56.92 .70	61.5 3.3
Sept. 5.9	30.53 +.42	64.9 -2.7	40.97 +.18	64.2 -0.4	4.09 +.22	16.1 +2.6	57.73+ .21	58.3 -3.2
15.9	30.98 .49	62.2 2.6	41.16 .21	63.8 0.6	4.34 .28	13.7 2.3	58.74 1.11	55.1 3.0
25.9	31.51 .55	59.7 2.4	41.38 .23	63.1 0.8	4.65 .34	11.6 1.8	59.95 1.30	52.3 2.8
Oct. 5.8	32.09 .61	57.4 2.1	41.63 .26	62.3 1.0	5.02 .39	10.0 1.3	61.33 1.46	49.6 2.5
15.8	32.73 .66	55.5 1.8	41.90 .28	61.2 1.2	5.44 .44	9.0 0.7	62.86 1.59	47.3 2.1
25.8	33.41 +.70	53.8 -1.5	42.19 +.30	60.0 -1.3	5.90 +.47	8.7 +0.1	64.52+1.70	45.5 -1.6
Nov. 4.8	34.12 .72	52.5 1.1	42.50 .31	58.6 1.5	6.38 .49	8.9 -0.6	66.27 1.77	44.1 1.2
14.7	34.85 .73	51.7 0.6	42.82 .32	57.1 1.5	6.87 .49	9.8 1.2	68.07 1.81	43.2 0.6
24.7	35.59 .73	51.3 -0.1	43.14 .32	55.5 1.6	7.36 .48	11.4 1.8	69.89 1.80	42.8 -0.1
Dec. 4.7	36.30 .70	51.5 +0.4	43.46 .31	53.9 1.6	7.82 .45	13.5 2.4	71.67 1.74	43.1 +0.5
14.6	36.98 +.65	52.1 +0.9	43.77 +.29	52.4 -1.5	8.25 +.40	16.1 -2.9	73.37+1.63	43.9 +1.1
24.6	37.60 .58	53.2 1.3	44.05 .26	50.9 1.4	8.63 .34	19.2 3.2	74.93 1.47	45.2 1.6
34.6	38.14 +.50	54.8 +1.8	44.29 +.22	49.7 -1.2	8.94 +.27	22.6 -3.5	76.31+1.26	47.0 +2.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Hydus.		$\delta$ Ursæ Majoris.		$\theta$ Ursæ Majoris.		$\epsilon$ Leonis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 9 22 <sup>m</sup>	— 8° 10'	<sup>h</sup> 9 24 <sup>m</sup>	+70° 18'	<sup>h</sup> 9 25 <sup>m</sup>	+52° 10'	<sup>h</sup> 9 39 <sup>m</sup>	+24° 17'
Jan. 0.6	5.37 +.34	25.1 —.24	34.62 +.63	65.0 +1.5	21.88 +.38	61.9 +0.7	29.63 +.29	15.2 —0.8
10.6	5.59 .30	27.4 2.3	35.20 .52	66.7 1.9	22.23 .32	62.8 1.1	29.90 .25	14.5 0.5
20.6	5.77 .15	29.7 2.1	35.67 .41	68.8 2.3	22.52 .25	64.1 1.4	30.12 .30	14.2 —0.2
30.5	5.90 .11	31.7 2.0	36.01 .27	71.3 2.6	22.74 .18	65.7 1.7	30.30 .15	14.1 +0.1
Feb. 9.5	5.98 .06	33.6 1.7	36.22 .14	74.0 2.8	22.88 .10	67.6 2.0	30.42 .10	14.4 0.4
19.5	6.02 +.01	35.2 —1.5	36.29 +.01	76.8 +2.8	22.94 +.02	69.6 +2.1	30.49 +.04	14.9 +0.6
29.5	6.00 —.03	36.6 1.2	36.23 —.13	79.6 2.7	22.93 —.05	71.7 2.1	30.50 —.01	15.6 0.8
Mar. 10.4	5.95 .07	37.7 1.0	36.04 .24	82.3 2.6	22.84 .12	73.9 2.1	30.47 .05	16.4 0.9
20.4	5.86 .10	38.5 0.7	35.74 .34	84.8 2.3	22.69 .17	75.9 1.9	30.39 .09	17.3 0.9
30.4	5.74 .13	39.1 0.5	35.35 .42	87.0 2.0	22.50 .21	77.7 1.7	30.29 .12	18.3 1.0
Apr. 9.3	5.60 —.14	39.5 —0.2	34.89 —.48	88.7 +1.6	22.27 —.24	79.2 +1.4	30.15 —.14	19.2 +0.9
19.3	5.46 .15	39.6 0.0	34.39 .52	90.1 1.1	22.01 .26	80.5 1.1	30.00 .15	20.2 0.9
29.3	5.31 .15	39.5 +0.2	33.86 .53	90.9 0.6	21.75 .26	81.4 0.7	29.85 .15	21.0 0.8
May 9.3	5.16 .14	39.2 0.4	33.34 .52	91.2 +0.1	21.49 .25	81.9 +0.3	29.70 .15	21.7 0.6
19.2	5.03 .13	38.8 0.6	32.83 .48	91.1 —0.4	21.24 .23	82.0 —0.1	29.55 .14	22.2 0.5
29.2	4.91 —.11	38.1 +0.7	32.37 —.44	90.4 —0.9	21.02 —.21	81.8 —0.4	29.42 —.12	22.6 +0.3
June 8.2	4.80 .09	37.3 0.9	31.96 .38	89.3 1.3	20.83 .17	81.2 0.8	29.31 .10	22.9 +0.2
18.2	4.73 .07	36.4 1.0	31.61 .30	87.7 1.6	20.68 .13	80.2 1.1	29.22 .09	23.0 0.0
28.1	4.67 .04	35.4 1.1	31.35 .22	85.7 2.1	20.57 .09	78.9 1.4	29.16 .06	22.9 —0.1
July 8.1	4.64 —.02	34.3 1.1	31.17 .14	83.4 2.4	20.50 —.04	77.3 1.7	29.13 —.02	22.7 0.3
18.1	4.63 +.01	33.2 +1.1	31.08 —.05	80.9 —2.7	20.48 .00	75.5 —1.9	29.12 +.01	22.4 —0.4
28.0	4.65 .03	32.0 1.1	31.08 +.05	78.1 2.9	20.51 +.05	73.5 2.1	29.14 .03	21.8 0.6
Aug. 7.0	4.70 .06	30.9 1.0	31.17 .14	75.1 3.0	20.58 .10	71.3 2.2	29.19 .08	21.2 0.7
17.0	4.78 .09	30.0 0.9	31.35 .23	72.1 3.0	20.70 .15	69.0 2.3	29.27 .09	20.4 0.9
27.0	4.89 .12	29.1 0.7	31.63 .32	69.1 3.0	20.87 .19	66.6 2.4	29.38 .12	19.4 1.0
Sept. 5.9	5.02 +.15	28.5 +0.5	31.99 +.40	66.0 —3.0	21.09 +.24	64.2 —2.4	29.52 +.16	18.3 —1.2
15.9	5.19 .18	28.2 +0.2	32.44 .49	63.1 2.9	21.35 .28	61.8 2.4	29.69 .19	17.0 1.3
25.9	5.38 .21	28.1 —0.1	32.97 .57	60.3 2.7	21.65 .33	59.4 2.3	29.89 .22	15.6 1.5
Oct. 5.9	5.61 .24	28.4 0.5	33.57 .64	57.7 2.4	22.00 .37	57.1 2.2	30.13 .25	14.1 1.6
15.8	5.86 .27	29.0 0.8	34.24 .70	55.4 2.1	22.39 .41	54.9 2.1	30.40 .28	12.5 1.7
25.8	6.14 +.29	30.0 —1.2	34.97 +.75	53.4 —1.8	22.82 +.44	52.9 —1.8	30.69 +.31	10.8 —1.7
Nov. 4.8	6.44 .30	31.4 1.5	35.75 .79	51.8 1.4	23.27 .48	51.2 1.6	31.01 .33	9.1 1.7
14.7	6.75 .31	33.0 1.8	36.55 .81	50.7 0.9	23.74 .48	49.8 1.2	31.35 .34	7.4 1.7
24.7	7.07 .32	34.9 2.0	37.37 .81	50.0 —0.4	24.22 .48	48.7 0.9	31.70 .35	5.7 1.6
Dec. 4.7	7.38 .31	37.1 2.2	38.18 .79	49.9 +0.1	24.71 .47	48.0 —0.4	32.05 .35	4.2 1.4
14.7	7.68 +.29	39.4 —2.3	38.96 +.75	50.3 +0.6	25.17 +.45	47.8 0.0	32.39 +.33	2.9 —1.2
24.6	7.96 .26	41.7 2.4	39.68 .69	51.2 1.2	25.61 .41	48.0 +0.4	32.72 .31	1.8 1.0
34.6	8.21 +.23	44.1 —2.3	40.33 +.60	52.6 +1.7	26.00 +.36	48.6 +0.8	33.01 +.28	1.0 —0.7



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\mu$ Leonis.		$\alpha$ Leonis. (Regulus.)		32 Ursæ Majoris.		$\gamma^1$ Leonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 9 <sup>m</sup> 46	+26° 31'	<sup>h</sup> 10 <sup>m</sup> 2	+12° 30'	<sup>h</sup> 10 <sup>m</sup> 9	+65° 39'	<sup>h</sup> 10 <sup>m</sup> 13	+20° 24'
Jan. 0.6	<sup>a</sup> 23.58 +.30	55.1 -0.7	<sup>a</sup> 24.41 +.29	47.6 -1.4	<sup>a</sup> 53.61 +.59	45.3 +0.8	<sup>a</sup> 47.72 +.31	22.4 -1.2
10.6	23.86 .26	54.5 0.4	24.68 .25	46.3 1.2	54.17 .59	46.4 1.3	48.01 .27	21.3 0.9
20.6	24.10 .21	54.3 -0.1	24.90 .21	45.2 1.0	54.65 .43	47.9 1.7	48.25 .23	20.6 0.6
30.6	24.28 .15	54.4 +0.2	25.09 .16	44.3 0.7	55.04 .33	49.9 2.2	48.46 .18	20.2 -0.3
Feb. 9.5	24.41 .10	54.7 0.5	25.22 .11	43.8 0.4	55.32 .23	52.2 2.4	48.61 .13	20.1 0.0
19.5	24.49 +.05	55.3 +0.7	25.31 +.06	43.5 -0.2	55.50 +.12	54.7 +2.6	48.72 +.08	20.2 +0.3
29.5	24.51 .00	56.1 0.9	25.34 +.01	43.4 +0.1	55.56 +.01	57.5 2.7	48.77 +.03	20.7 0.5
Mar. 10.4	24.48 -.05	57.1 1.0	25.33 -.03	43.6 0.3	55.51 -.09	60.2 2.7	48.77 -.02	21.3 0.7
20.4	24.41 .08	58.1 1.1	25.28 .07	43.9 0.4	55.37 .18	62.8 2.5	48.73 .06	22.1 0.8
30.4	24.31 .12	59.2 1.1	25.20 .10	44.4 0.5	55.14 .26	65.3 2.3	48.65 .09	22.9 0.9
Apr. 9.4	24.18 -1.4	60.3 +1.0	25.09 -.12	45.0 +0.6	54.84 -.33	67.5 +2.0	48.55 -.11	23.9 +0.9
19.3	24.03 .15	61.3 0.9	24.97 .13	45.7 0.7	54.48 .37	69.3 1.6	48.43 .13	24.8 0.9
29.3	23.87 .16	62.2 0.8	24.84 .14	46.3 0.7	54.10 .40	70.7 1.1	48.30 .14	25.7 0.8
May 9.3	23.72 .15	62.9 0.7	24.70 .13	47.0 0.7	53.69 .40	71.6 0.7	48.16 .14	26.5 0.8
19.3	23.57 .14	63.5 0.5	24.57 .12	47.6 0.6	53.29 .40	72.0 +0.2	48.02 .13	27.2 0.7
29.2	23.44 -.13	63.9 +0.3	24.45 -.11	48.3 +0.6	52.90 -.38	72.0 -0.2	47.90 -.12	27.8 +0.5
June 8.2	23.32 .11	64.1 +0.1	24.34 .10	48.8 0.5	52.54 .34	71.5 0.8	47.78 .11	28.3 0.4
18.2	23.22 .06	64.2 0.0	24.25 .08	49.3 0.5	52.21 .30	70.5 1.2	47.68 .09	28.6 0.2
28.2	23.15 .06	64.0 -0.2	24.18 .06	49.7 0.4	51.94 .25	69.0 1.6	47.60 .07	28.7 +0.1
July 8.1	23.11 -.03	63.7 0.4	24.13 .04	50.1 0.3	51.72 .19	67.2 2.0	47.54 .05	28.8 -0.1
18.1	23.10 .00	63.3 -0.5	24.10 -.02	50.3 +0.2	51.56 -.12	65.0 -2.3	47.51 -.02	28.6 -0.2
28.1	23.11 +.03	62.6 0.7	24.10 +.01	50.4 +0.1	51.47 -.06	62.5 2.6	47.50 .00	28.3 0.4
Aug. 7.0	23.15 .06	61.8 0.9	24.12 .04	50.4 -0.1	51.45 +.01	59.8 2.8	47.51 +.03	27.8 0.5
17.0	23.23 .09	60.9 1.0	24.17 .06	50.2 0.2	51.50 .08	56.9 3.0	47.55 .06	27.2 0.7
27.0	23.33 .12	59.8 1.2	24.25 .09	49.9 0.4	51.62 .16	53.8 3.1	47.62 .09	26.4 0.9
Sept. 6.0	23.46 +.15	58.5 -1.3	24.36 +.12	49.4 -0.6	51.81 +.23	50.7 -3.1	47.72 +.12	25.4 -1.1
15.9	23.63 .18	57.1 1.5	24.49 .15	48.7 0.8	52.08 .30	47.6 3.1	47.86 .15	24.2 1.3
25.9	23.83 .22	55.5 1.6	24.66 .19	47.8 1.0	52.42 .37	44.5 3.0	48.02 .18	22.9 1.5
Oct. 5.9	24.07 .25	53.9 1.7	24.86 .22	46.7 1.2	52.83 .44	41.5 2.9	48.22 .22	21.4 1.6
15.8	24.33 .28	52.2 1.8	25.10 .25	45.4 1.4	53.31 .51	38.7 2.7	48.46 .25	19.7 1.7
25.8	24.63 +.31	50.4 -1.8	25.36 +.28	43.9 -1.6	53.85 +.57	36.1 -2.4	48.72 +.28	17.9 -1.8
Nov. 4.8	24.95 .33	48.6 1.8	25.65 .30	42.3 1.7	54.44 .61	33.9 2.1	49.02 .31	16.0 1.9
14.8	25.29 .35	46.8 1.7	25.97 .28	40.5 1.8	55.08 .65	32.0 1.6	49.34 .33	14.1 1.9
24.7	25.64 .36	45.2 1.6	26.29 .23	38.7 1.8	55.74 .67	30.6 1.2	49.68 .34	12.3 1.8
Dec. 4.7	26.00 .35	43.7 1.4	26.62 .23	36.8 1.8	56.42 .68	29.7 0.7	50.02 .35	10.4 1.7
14.7	26.35 +.34	42.3 -1.2	26.95 +.29	35.1 -1.7	57.10 +.66	29.3 -0.1	50.37 +.34	8.8 -1.6
24.7	26.68 .32	41.3 0.9	27.27 .20	33.4 1.6	57.74 .69	29.4 +0.4	50.70 .38	7.3 1.4
34.6	26.99 +.29	40.5 -0.6	27.56 +.28	31.9 -1.4	58.34 +.57	30.1 +0.9	51.01 +.30	6.1 -1.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	9 Draconis (H.)		$\rho$ Leonis.		$\gamma$ Argus.		$\iota$ Leonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 10 <sup>m</sup> 25	+76° 16'	<sup>h</sup> 10 <sup>m</sup> 26	+ 9° 52'	<sup>h</sup> 10 <sup>m</sup> 40	-59° 5'	<sup>h</sup> 10 <sup>m</sup> 43	+11° 7'
Jan. 0.7	33.90 +.98	66.9 +1.0	54.73 +.30	55.0 -1.6	44.37 +.43	28.0 -2.8	22.01 +.31	73.1 -1.7
10.6	34.83 .87	68.2 1.5	55.02 .96	53.5 1.4	44.78 .38	31.0 3.2	22.31 .98	71.5 1.4
20.6	35.65 .74	69.9 2.0	55.26 .92	52.2 1.2	45.12 .31	34.3 3.4	22.56 .94	70.2 1.2
30.6	36.31 .58	72.2 2.4	55.46 .18	51.1 0.9	45.40 .94	37.8 3.6	22.78 .90	69.1 0.9
Feb. 9.6	36.82 .41	74.8 2.7	55.62 .13	50.3 0.6	45.60 .16	41.5 3.7	22.96 .15	68.4 0.6
19.5	37.13 +.29	77.6 +2.9	55.73 +.08	49.8 -0.4	45.72 +.08	45.2 -3.6	23.08 +.10	67.9 -0.3
29.5	37.26 +.04	80.6 3.0	55.79 +.04	49.6 -0.1	45.76 +.01	48.8 3.5	23.16 .06	67.7 -0.1
Mar. 10.5	37.21 -.14	83.7 3.0	55.80 .00	49.6 +0.1	45.73 -.06	52.3 3.4	23.19 +.01	67.8 +0.2
20.4	36.99 .30	86.6 2.6	55.78 -.04	49.8 0.3	45.63 .13	55.5 3.1	23.18 -.03	68.1 0.4
30.4	36.61 .45	89.3 2.6	55.72 .07	50.2 0.4	45.47 .18	58.5 2.8	23.14 .06	68.5 0.5
Apr. 9.4	36.09 -.57	91.7 +2.2	55.63 -.10	50.6 +0.5	45.26 -.33	61.1 -2.4	23.06 -.08	69.1 +0.6
19.4	35.47 .66	93.7 1.8	55.53 .11	51.2 0.6	45.01 .97	63.3 2.0	22.97 .10	69.7 0.7
29.3	34.77 .72	95.3 1.3	55.41 .12	51.9 0.7	44.72 .30	65.1 1.8	22.86 .12	70.4 0.7
May 9.3	34.03 .75	96.3 0.8	55.28 .12	52.6 0.7	44.41 .32	66.5 1.1	22.74 .12	71.2 0.7
19.3	33.27 .76	96.8 +0.2	55.16 .12	53.2 0.7	44.09 .33	67.3 0.6	22.61 .12	71.9 0.7
29.3	32.52 -.73	96.7 -0.3	55.04 -.12	53.9 +0.6	43.76 -.33	67.7 -0.1	22.50 -.12	72.6 +0.7
June 8.2	31.80 .69	96.1 0.9	54.93 .10	54.5 0.6	43.43 .33	67.5 +0.4	22.38 .11	73.3 0.6
18.2	31.14 .62	95.0 1.4	54.83 .09	55.1 0.5	43.11 .31	66.8 0.9	22.28 .10	73.8 0.5
28.2	30.56 .54	93.4 1.8	54.75 .07	55.6 0.5	42.80 .99	65.7 1.3	22.19 .08	74.3 0.4
July 8.1	30.07 .45	91.3 2.2	54.68 .05	56.0 0.4	42.52 .98	64.1 1.8	22.12 .06	74.7 0.3
18.1	29.68 -.34	88.9 -2.6	54.64 -.03	56.4 +0.3	42.28 -.93	62.2 +2.2	22.07 -.05	75.0 +0.2
28.1	29.41 .21	86.1 2.9	54.62 -.01	56.6 +0.2	42.07 .18	59.8 2.5	22.03 -.03	75.2 +0.1
Aug. 7.1	29.25 -.09	83.0 3.1	54.61 +.01	56.7 0.0	41.92 .13	57.3 2.7	22.01 .00	75.2 -0.1
17.0	29.22 +.03	79.8 3.3	54.64 .04	56.7 -0.1	41.82 -.07	54.5 2.8	22.02 +.02	75.1 0.2
27.0	29.32 .17	76.4 3.4	54.69 .07	56.5 0.3	41.78 .00	51.6 2.9	22.06 .05	74.8 0.4
Sept. 6.0	29.55 +.30	73.0 -3.5	54.77 +.10	56.1 -0.5	41.81 +.07	48.7 +2.8	22.12 +.08	74.3 -0.6
16.0	29.91 .42	69.5 3.4	54.88 .13	55.5 0.7	41.92 .14	45.9 2.6	22.22 .11	73.6 0.8
25.9	30.40 .55	66.1 3.3	55.03 .16	54.7 0.9	42.09 .21	43.4 2.4	22.35 .15	72.7 1.0
Oct. 5.9	31.02 .67	62.8 3.2	55.21 .20	53.7 1.2	42.34 .29	41.2 2.0	22.51 .18	71.5 1.3
15.9	31.75 .79	59.8 2.9	55.42 .23	52.4 1.4	42.67 .35	39.4 1.5	22.71 .22	70.2 1.5
25.8	32.59 +.89	57.0 -2.6	55.67 +.26	50.9 -1.6	43.05 +.41	38.1 +1.0	22.95 +.25	68.6 -1.7
Nov. 4.8	33.53 .98	54.6 2.2	55.94 .29	49.3 1.7	43.49 .46	37.4 +0.4	23.22 .28	66.9 1.8
14.8	34.55 1.04	52.7 1.7	56.25 .30	47.4 1.9	43.97 .49	37.3 -0.2	23.51 .31	65.0 1.9
24.8	35.62 1.09	51.2 1.2	56.57 .31	45.5 1.9	44.48 .51	37.9 0.9	23.83 .22	63.0 2.0
Dec. 4.7	36.73 1.10	50.3 -0.6	56.90 .33	43.6 1.9	44.99 .51	39.1 1.5	24.16 .33	61.0 2.0
14.7	37.83+1.08	50.0 0.0	57.23 +.33	41.7 -1.9	45.50 +.50	40.8 -2.0	24.50 +.33	59.0 -1.9
24.7	38.90 1.03	50.2 +0.5	57.55 .31	39.8 1.8	45.98 .46	43.1 2.5	24.82 .32	57.2 1.8
34.6	39.90+ .97	51.1 +1.1	57.85 +.29	38.2 -1.6	46.42 +.41	45.9 -3.0	25.13 +.30	55.5 -1.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ursæ Majoris.		$\delta$ Leonis.		$\delta$ Crateris.		$\gamma$ Leonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 10 <sup>m</sup> 56	<sup>°</sup> +62 <sup>'</sup> 20	<sup>h</sup> 11 <sup>m</sup> 8	<sup>°</sup> +21 <sup>'</sup> 7	<sup>h</sup> 11 <sup>m</sup> 13	<sup>°</sup> -14 <sup>'</sup> 10	<sup>h</sup> 11 <sup>m</sup> 22	<sup>°</sup> +3 <sup>'</sup> 28
Jan. 0.7	48.14 +.58	65.8 0.0	8.70 +.33	69.1 -1.6	44.36 +.31	14.8 -2.3	10.28 +.32	23.8 -2.0
10.7	48.70 .52	66.1 +0.6	9.01 .30	67.7 1.2	44.66 .29	17.2 2.3	10.59 .29	21.9 1.8
20.6	49.19 .46	67.0 1.2	9.30 .27	66.7 0.8	44.93 .25	19.5 2.3	10.87 .26	20.1 1.6
30.6	49.62 .38	68.4 1.6	9.55 .23	66.1 0.5	45.16 .21	21.8 2.2	11.11 .22	18.6 1.4
Feb. 9.6	49.96 .30	70.3 2.1	9.76 .18	65.8 -0.1	45.35 .17	23.9 2.1	11.31 .18	17.3 1.1
19.5	50.22 +.20	72.6 +2.4	9.91 +.13	65.9 +0.2	45.50 +.12	25.9 -1.9	11.47 +.14	16.3 -0.9
29.5	50.37 .11	75.1 2.8	10.02 .09	66.2 0.5	45.60 .08	27.7 1.6	11.58 .09	15.6 0.6
Mar. 10.5	50.43 +.01	77.8 2.7	10.09 +.04	66.9 0.7	45.66 +.04	29.2 1.4	11.65 .05	15.1 0.3
20.5	50.40 -0.7	80.5 2.7	10.10 .00	67.7 0.9	45.67 .00	30.4 1.1	11.68 +.01	14.9 -0.1
30.4	50.28 .15	83.1 2.6	10.08 -0.4	68.7 1.0	45.65 -0.4	31.4 0.9	11.67 -0.2	15.0 +0.1
Apr. 9.4	50.09 -0.22	85.6 +2.3	10.02 -0.7	69.8 +1.1	45.60 -0.6	32.2 -0.6	11.63 -0.5	15.2 +0.3
19.4	49.85 .27	87.8 2.0	9.94 .09	71.0 1.1	45.52 .08	32.7 0.4	11.57 .07	15.5 0.4
29.4	49.56 .31	89.7 1.7	9.83 .11	72.1 1.1	45.43 .10	33.0 -0.2	11.49 .09	16.0 0.5
May 9.3	49.23 .33	91.1 1.2	9.72 .12	73.1 1.0	45.32 .11	33.0 +0.1	11.39 .10	16.6 0.6
19.3	48.90 .34	92.1 0.8	9.59 .12	74.1 0.9	45.21 .12	32.9 0.3	11.29 .11	17.2 0.6
29.3	48.55 -0.34	92.7 +0.3	9.47 -0.12	74.9 +0.8	45.09 -0.12	32.5 +0.5	11.18 -0.11	17.9 +0.7
June 8.3	48.22 .32	92.8 -0.2	9.35 .12	75.6 0.6	44.97 .12	32.0 0.6	11.07 .11	18.6 0.7
18.2	47.90 .30	92.4 0.6	9.23 .11	76.1 0.4	44.86 .11	31.2 0.8	10.97 .10	19.2 0.7
28.2	47.62 .27	91.5 1.1	9.13 .10	76.4 +0.2	44.75 .10	30.4 0.9	10.87 .09	19.9 0.6
July 8.2	47.37 .23	90.1 1.5	9.04 .08	76.5 0.0	44.65 .09	29.4 1.0	10.78 .09	20.5 0.6
18.1	47.16 -0.18	88.4 -1.9	8.96 -0.07	76.5 -0.2	44.57 -0.08	28.3 +1.1	10.70 -0.07	21.1 +0.5
28.1	47.00 .14	86.3 2.3	8.90 .05	76.2 0.4	44.49 .06	27.1 1.2	10.63 .06	21.6 0.4
Aug. 7.1	46.89 .08	83.8 2.6	8.86 -0.03	75.7 0.6	44.44 .04	26.0 1.2	10.58 .04	21.9 0.3
17.1	46.84 -0.02	81.1 2.8	8.85 .00	75.0 0.8	44.41 -0.02	24.8 1.1	10.55 -0.02	22.2 +0.2
27.0	46.84 +0.04	78.2 3.0	8.86 +0.03	74.1 1.0	44.40 +0.01	23.7 1.0	10.55 +0.01	22.3 0.0
Sept. 6.0	46.91 +0.10	75.1 -3.2	8.90 +0.06	73.0 -1.2	44.43 +0.04	22.7 +0.9	10.57 +0.04	22.2 -0.2
16.0	47.05 .17	71.8 3.3	8.98 .09	71.7 1.4	44.49 .08	22.0 0.7	10.63 .07	21.9 0.4
26.0	47.25 .24	68.6 3.3	9.09 .13	70.1 1.6	44.58 .11	21.4 0.4	10.72 .11	21.4 0.6
Oct. 5.9	47.52 .31	65.3 3.2	9.24 .17	68.4 1.8	44.72 .15	21.2 +0.1	10.84 .14	20.7 0.9
15.9	47.86 .37	62.1 3.1	9.42 .20	66.5 2.0	44.89 .19	21.3 -0.2	11.01 .18	19.6 1.1
25.9	48.27 +0.44	59.1 -2.9	9.65 +0.24	64.5 -2.1	45.10 +0.23	21.7 -0.6	11.21 +0.22	18.4 -1.4
Nov. 4.8	48.74 .49	56.3 2.6	9.91 .28	62.3 2.2	45.35 .27	22.5 1.0	11.45 .26	16.8 1.6
14.8	49.26 .54	53.8 2.3	10.20 .31	60.2 2.2	45.64 .30	23.6 1.3	11.72 .29	15.1 1.8
24.8	49.83 .58	51.7 1.9	10.52 .33	58.0 2.2	45.95 .32	25.1 1.6	12.02 .31	13.2 2.0
Dec. 4.8	50.42 .60	50.1 1.4	10.86 .34	55.8 2.1	46.27 .33	26.9 1.9	12.34 .32	11.1 2.1
14.7	51.03 +0.61	48.9 -0.9	11.21 +0.35	53.9 -1.9	46.60 +0.33	28.9 -2.1	12.67 +0.33	9.0 -2.1
24.7	51.63 .59	48.3 -0.3	11.56 .34	52.1 1.7	46.93 .32	31.1 2.3	13.00 .32	6.9 2.1
34.7	52.22 +0.56	48.3 +0.3	11.90 +0.33	50.6 -1.4	47.25 +0.30	33.5 -2.4	13.32 +0.32	4.9 -2.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\lambda$ Draconis.		$\nu$ Leonis.		$\beta$ Leonis.		$\gamma$ Ursæ Majoris.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 11 24	+69° 56'	<sup>h</sup> <sup>m</sup> 11 31	— 0° 12'	<sup>h</sup> <sup>m</sup> 11 43	+15° 11'	<sup>h</sup> <sup>m</sup> 11 47	+54° 18'
Jan. 0.7	43.90 +.75	42.1 0.0	12.48 +.32	17.1 —2.1	20.24 +.33	51.0 —1.8	55.41 +.50	50.2 —0.9
10.7	44.64 .71	42.3 +0.5	12.79 .30	19.1 2.0	20.56 .31	49.3 1.5	55.89 .47	49.6 —0.3
20.7	45.32 .84	43.2 1.1	13.07 .36	21.0 1.8	20.86 .28	47.9 1.2	56.34 .43	49.7 +0.3
30.6	45.92 .55	44.6 1.7	13.32 .33	22.7 1.6	21.12 .25	46.9 0.9	56.75 .38	50.2 0.9
Feb. 9.6	46.43 .45	46.5 2.1	13.52 .19	24.2 1.4	21.35 .21	46.1 0.6	57.10 .32	51.4 1.4
19.6	46.82 +.33	48.9 +2.5	13.69 +.14	25.5 —1.1	21.54 +.16	45.8 —0.3	57.39 +.25	53.0 +1.8
29.5	47.08 .30	51.6 2.8	13.81 .10	26.4 0.8	21.68 .12	45.7 +0.1	57.60 .18	54.9 2.1
Mar. 10.5	47.22 +.06	54.4 2.9	13.89 .06	27.1 0.6	21.77 .07	45.9 0.4	57.74 .10	57.2 2.4
20.5	47.24 —.04	57.4 2.9	13.93 +.02	27.5 0.3	21.82 +.03	46.4 0.6	57.81 +.03	59.7 2.5
30.5	47.14 .15	60.3 2.8	13.93 —.02	27.7 —0.1	21.8 —.01	47.1 0.8	57.81 —.03	62.3 2.6
Apr. 9.4	46.93 —.25	63.1 +2.6	13.90 —.04	27.7 +0.1	21.81 —.04	48.0 +0.9	57.74 —.09	64.8 +2.5
19.4	46.63 .34	65.6 2.3	13.84 .07	27.6 0.2	21.76 .06	48.9 1.0	57.62 .14	67.2 2.3
29.4	46.26 .40	67.8 2.0	13.76 .08	27.2 0.4	21.69 .08	50.0 1.0	57.45 .18	69.5 2.1
May 9.3	45.83 .45	69.5 1.5	13.67 .10	26.8 0.5	21.60 .10	51.0 1.0	57.25 .21	71.4 1.8
19.3	45.36 .48	70.8 1.0	13.57 .10	26.3 0.6	21.49 .11	51.9 0.9	57.03 .23	73.0 1.4
29.3	44.87 —.49	71.6 +0.5	13.47 —.11	25.7 +0.6	21.38 —.11	52.8 +0.9	56.80 —.25	74.2 +1.0
June 8.3	44.38 .49	71.8 0.0	13.36 .11	25.0 0.7	21.27 .11	53.6 0.7	56.55 .25	74.9 0.5
18.2	43.90 .47	71.6 —0.5	13.26 .10	24.3 0.7	21.16 .11	54.3 0.6	56.30 .25	75.2 +0.1
28.2	43.45 .44	70.8 1.0	13.15 .10	23.6 0.7	21.05 .10	54.8 0.4	56.06 .24	75.1 —0.4
July 8.2	43.03 .39	69.5 1.5	13.06 .09	23.0 0.7	20.95 .10	55.2 0.3	55.83 .22	74.5 0.8
18.2	42.66 —.34	67.7 —2.0	12.98 —.06	22.3 +0.6	20.85 —.09	55.4 +0.1	55.62 —.19	73.5 —1.2
28.1	42.35 .28	65.6 2.4	12.90 .06	21.7 0.6	20.77 .07	55.5 —0.1	55.44 .17	72.0 1.6
Aug. 7.1	42.11 .21	63.0 2.7	12.85 .04	21.1 0.5	20.71 .06	55.3 0.3	55.30 .14	70.2 2.0
17.1	41.93 .13	60.1 3.0	12.81 —.03	20.7 0.4	20.66 .04	54.9 0.5	55.18 .10	68.0 2.3
27.0	41.84 —.05	57.0 3.2	12.80 .00	20.4 +0.2	20.64 —.01	54.4 0.7	55.11 .05	65.5 2.6
Sept. 6.0	41.83 +.03	53.7 —3.4	12.81 +.03	20.3 0.0	20.64 +.02	53.6 —0.9	55.08 —.01	62.8 —2.9
16.0	41.91 .13	50.2 3.5	12.85 .06	20.3 —0.2	20.67 .05	52.6 1.1	55.11 +.04	59.8 3.1
26.0	42.08 .22	46.6 3.6	12.93 .10	20.6 0.4	20.74 .09	51.4 1.3	55.20 .10	56.6 3.2
Oct. 5.9	42.34 .31	43.0 3.5	13.05 .14	21.2 0.7	20.85 .13	49.9 1.6	55.33 .16	53.3 3.3
15.9	42.71 .41	39.6 3.4	13.20 .18	22.0 1.0	20.99 .17	48.3 1.8	55.53 .22	50.1 3.3
25.9	43.16 +.50	36.2 —3.2	13.40 +.21	23.1 —1.2	21.18 +.21	46.4 —2.0	55.78 +.28	46.8 —3.2
Nov. 4.9	43.70 .58	33.2 2.9	13.63 .25	24.5 1.5	21.41 .25	44.3 2.1	56.09 .34	43.6 3.1
14.8	44.33 .66	30.4 2.6	13.90 .28	25.1 1.7	21.67 .28	42.2 2.2	56.46 .39	40.6 2.9
24.8	45.02 .72	28.0 2.1	14.19 .31	25.0 1.9	21.97 .31	39.9 2.2	56.89 .43	37.9 2.6
Dec. 4.8	45.76 .76	26.1 1.6	14.51 .32	30.0 2.0	22.29 .33	37.7 2.2	57.35 .47	35.5 2.2
14.8	46.53 +.78	24.8 —1.1	14.84 +.33	32.1 —2.1	22.62 +.34	35.5 —2.1	57.83 +.49	33.6 —1.7
24.7	47.32 .77	24.0 —0.5	15.17 .33	34.2 2.1	22.96 .34	33.5 2.0	58.33 .49	32.1 1.2
34.7	48.08 +.75	23.8 +0.1	15.49 +.31	36.3 —2.0	23.29 +.32	31.6 —1.7	58.83 +.48	31.2 —0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	o Virginis.		4 Draconis (H.)		γ Corvi.		β Chamæleonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 11 <sup>m</sup> 59	+ 9° 20'	<sup>h</sup> 12 <sup>m</sup> 6	+78° 13'	<sup>h</sup> 12 <sup>m</sup> 10	-16° 55'	<sup>h</sup> 12 <sup>m</sup> 11	-78° 40'
Jan. 0.7	<sup>s</sup> 29.61 +.33	78.4 -2.0	<sup>s</sup> 55.10+1.23	64.2 -0.4	<sup>s</sup> 2.34 +.34	2.4 -2.2	<sup>s</sup> 49.63+1.19	59.2 -1.4
10.7	29.93 .31	76.6 1.8	56.31 1.18	64.1 +0.2	2.66 .32	4.6 2.3	50.79 1.12	60.9 2.0
20.7	30.23 .29	74.9 1.5	57.46 1.11	64.6 0.9	2.97 .29	6.9 2.3	51.87 1.02	63.2 2.5
30.6	30.50 .25	73.5 1.2	58.52 1.00	65.8 1.5	3.25 .26	9.2 2.2	52.83 .89	65.9 2.9
Feb. 9.6	30.74 .21	72.5 0.9	59.45 .85	67.5 2.0	3.48 .22	11.4 2.1	53.65 .75	69.1 3.3
19.6	30.93 +.17	71.7 -0.6	60.23+ .68	69.8 +2.5	3.69 +.18	13.4 -2.0	54.32+ .59	72.5 -3.5
29.6	31.08 .13	71.3 -0.3	60.82 .49	72.4 2.8	3.85 .14	15.3 1.8	54.82 .42	76.2 3.7
Mar. 10.5	31.19 .09	71.2 0.0	61.21 .29	75.4 3.0	3.96 .10	17.0 1.6	55.16 .25	80.0 3.8
20.5	31.26 .05	71.3 +0.3	61.40+ .09	78.4 3.1	4.04 .06	18.5 1.3	55.32+ .08	83.8 3.8
30.5	31.29 +.01	71.7 0.5	61.38- .11	81.6 3.1	4.08 +.02	19.7 1.1	55.31- .09	87.5 3.7
Apr. 9.5	31.28 -.02	72.2 +0.6	61.17- .30	84.6 +2.9	4.08 -.01	20.7 -0.9	55.15- .24	91.1 -3.5
19.4	31.25 .05	72.9 0.7	60.79 .46	87.4 2.7	4.06 .04	21.4 0.6	54.83 .39	94.5 3.3
29.4	31.19 .07	73.7 0.8	60.25 .60	89.9 2.3	4.01 .06	22.0 0.4	54.36 .53	97.7 3.0
May 9.4	31.12 .08	74.6 0.8	59.58 .72	92.1 1.9	3.94 .08	22.3 -0.2	53.77 .65	100.5 2.6
19.3	31.03 .09	75.4 0.8	58.81 .81	93.8 1.4	3.86 .09	22.4 0.0	53.06 .75	102.9 2.2
29.3	30.93 -.10	76.3 +0.8	57.97- .86	95.0 +0.9	3.76 -.10	22.3 +0.2	52.26- .84	104.9 -1.7
June 8.3	30.83 .10	77.0 0.7	57.09 .89	95.6 +0.4	3.66 .11	22.0 0.4	51.38 .91	106.3 1.2
18.3	30.72 .11	77.8 0.7	56.18 .90	95.7 -0.2	3.54 .11	21.5 0.5	50.44 .96	107.3 0.7
28.2	30.61 .11	78.4 0.6	55.29 .87	95.2 0.7	3.43 .12	20.9 0.7	49.46 .98	107.7 -0.1
July 8.2	30.51 .10	78.9 0.5	54.44 .83	94.2 1.3	3.31 .11	20.1 0.8	48.48 .97	107.5 +0.4
18.2	30.41 -.09	79.3 +0.2	53.63- .77	92.7 -1.8	3.20 -.11	19.3 +0.9	47.52- .94	106.8 +0.9
28.2	30.33 .08	79.6 +0.2	52.91 .68	90.7 2.2	3.10 .10	18.3 1.0	46.60 .87	105.6 1.5
Aug. 7.1	30.25 .07	79.7 0.0	52.27 .58	88.3 2.6	3.00 .09	17.2 1.1	45.77 .78	103.9 1.9
17.1	30.19 .05	79.7 -0.1	51.74 .47	85.4 3.0	2.92 .07	16.1 1.1	45.04 .86	101.7 2.4
27.1	30.15 -.03	79.4 0.3	51.33 .34	82.3 3.3	2.87 .04	15.1 1.0	44.45 .51	99.2 2.7
Sept. 6.0	30.14 .00	79.0 -0.5	51.06- .20	78.9 -3.5	2.84 -.01	14.1 +0.9	44.02- .34	96.4 +2.9
16.0	30.16 +.03	78.3 0.8	50.94- .05	75.2 3.7	2.84 +.02	13.2 0.8	43.77- .15	93.4 3.0
26.0	30.21 .07	77.5 1.0	50.93+ .11	71.5 3.8	2.87 .06	12.5 0.6	43.73+ .06	90.3 3.0
Oct. 6.0	30.30 .11	76.3 1.2	51.15 .27	67.7 3.8	2.95 .10	12.1 +0.3	43.89 .27	87.3 2.9
15.9	30.43 .15	75.0 1.5	51.50 .43	63.9 3.7	3.07 .14	11.9 0.0	44.26 .47	84.5 2.7
25.9	30.60 +.19	73.4 -1.7	52.01+ .59	60.2 -3.5	3.24 +.19	12.1 -0.3	44.84+ .67	81.9 +2.4
Nov. 4.9	30.81 .23	71.6 1.9	52.68 .75	56.8 3.3	3.45 .22	12.6 0.7	45.60 .84	79.7 1.9
14.8	31.06 .27	69.5 2.1	53.51 .89	53.6 3.0	3.70 .27	13.4 1.0	46.53 .99	78.1 1.4
24.8	31.34 .30	67.4 2.2	54.47 1.09	50.9 2.5	3.99 .30	14.6 1.4	47.59 1.11	76.9 0.8
Dec. 4.8	31.65 .32	65.2 2.2	55.54 1.12	48.6 2.0	4.30 .32	16.1 1.7	48.74 1.18	76.4 +2.2
14.8	31.98 +.33	63.0 -2.2	56.70+1.18	46.8 -1.5	4.63 +.33	17.9 -1.9	49.95+1.22	76.5 -0.4
24.7	32.31 .33	60.9 2.1	57.91 1.22	45.6 0.8	4.97 .33	20.0 2.1	51.17 1.21	77.3 1.1
34.7	32.64 +.33	58.9 -1.9	59.14+1.24	45.1 -0.9	5.31 +.33	22.2 -2.3	52.37+1.17	78.7 -1.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Virginis.		$\alpha^1$ Crucis.		$\beta$ Corvi.		$\epsilon$ Draconis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 12 14	— 0' 2"	<sup>h</sup> <sup>m</sup> 12 20	— 62° 26'	<sup>h</sup> <sup>m</sup> 12 28	— 22° 46'	<sup>h</sup> <sup>m</sup> 12 28	+ 70° 23'
Jan. 0.7	<sup>s</sup> 9.93 +.33	<sup>"</sup> 35.9 —2.1	<sup>s</sup> 22.68 +.57	<sup>"</sup> 18.7 —1.6	<sup>s</sup> 29.72 +.34	<sup>"</sup> 26.0 —2.1	<sup>s</sup> 40.34 +.77	<sup>"</sup> 66.3 —0.9
10.7	10.25 .31	37.9 2.0	23.24 .54	20.6 2.2	30.06 .33	28.2 2.2	41.11 .76	65.7 —0.3
20.7	10.56 .29	39.9 1.8	23.76 .50	23.0 2.6	30.38 .31	30.5 2.3	41.86 .73	65.8 +0.3
30.7	10.83 .28	41.6 1.6	24.23 .44	25.8 2.9	30.67 .28	32.9 2.4	42.56 .67	66.4 1.0
Feb. 9.6	11.07 .28	43.1 1.4	24.65 .38	28.9 3.2	30.93 .24	35.2 2.3	43.19 .59	67.7 1.5
19.6	11.27 +.18	44.4 —1.1	24.99 +.21	32.3 —3.4	31.16 +.20	37.5 —2.2	43.73 +.49	69.5 +2.1
29.6	11.44 .14	45.4 0.9	25.26 .33	35.7 3.5	31.34 .16	39.6 2.0	44.17 .37	71.8 2.5
Mar. 10.5	11.56 .10	46.1 0.6	25.46 .16	39.3 3.5	31.48 .12	41.6 1.9	44.48 .26	74.5 2.8
20.5	11.64 .06	46.5 0.3	25.57 .08	42.7 3.4	31.57 .08	43.4 1.7	44.67 .13	77.4 2.9
30.5	11.68 +.03	46.7 —0.1	25.62 +.01	46.1 3.3	31.63 .04	44.9 1.4	44.75 +.01	80.4 3.0
Apr. 9.5	11.69 .00	46.7 +0.1	25.60 —.05	49.4 —3.1	31.66 +.01	46.3 —1.2	44.70 —.10	83.4 +3.0
19.4	11.68 —.03	46.5 0.3	25.52 .11	52.4 2.9	31.65 —.02	47.4 1.0	44.54 .20	86.3 2.8
29.4	11.63 .05	46.2 0.4	25.38 .17	55.0 2.5	31.62 .04	48.3 0.8	44.29 .29	89.0 2.5
May 9.4	11.57 .07	45.7 0.5	25.19 .22	57.4 2.2	31.56 .07	48.9 0.5	43.95 .37	91.4 2.2
19.4	11.50 .08	45.2 0.6	24.95 .26	59.4 1.8	31.49 .08	49.3 0.3	43.55 .43	93.3 1.8
29.3	11.41 —.09	44.6 +0.6	24.67 —.29	61.0 —1.3	31.40 —.10	49.5 —0.1	43.10 —.47	94.9 +1.3
June 8.3	11.31 .10	43.9 0.7	24.36 .28	62.1 0.9	31.29 .11	49.4 +0.2	42.61 .50	95.9 0.6
18.3	11.21 .10	43.2 0.7	24.01 .34	62.7 —0.4	31.18 .12	49.2 0.4	42.10 .51	96.4 +0.3
28.2	11.11 .10	42.6 0.7	23.68 .26	62.9 +0.1	31.06 .12	48.7 0.6	41.59 .51	96.4 —0.3
July 8.2	11.00 .10	41.9 0.6	23.32 .26	62.6 0.6	30.93 .12	48.0 0.8	41.08 .49	95.9 0.6
18.2	10.90 —.10	41.3 +0.6	22.97 —.26	61.7 + 1.0	30.81 —.12	47.2 +0.9	40.60 —.47	94.8 —1.2
28.2	10.81 .09	40.7 0.5	22.63 .33	60.5 1.5	30.68 .12	46.2 1.1	40.15 .43	93.2 1.6
Aug. 7.1	10.72 .08	40.2 0.4	22.31 .29	58.7 1.9	30.57 .11	45.0 1.2	39.75 .36	91.2 2.2
17.1	10.65 .06	39.9 0.3	22.04 .25	56.7 2.2	30.47 .09	43.8 1.2	39.40 .28	88.8 2.6
27.1	10.60 .04	39.6 +0.2	21.81 .19	54.3 2.5	30.39 .07	42.6 1.2	39.11 .25	86.0 3.0
Sept. 6.1	10.57 —.01	39.5 0.0	21.65 —.13	51.7 +2.7	30.34 —.04	41.4 +1.2	38.91 —.17	82.8 —3.3
16.0	10.57 +.02	39.7 —0.2	21.56 —.05	49.0 2.7	30.32 .00	40.2 1.1	38.78 —.08	79.4 3.5
26.0	10.61 .05	40.0 0.4	21.56 +.04	46.3 2.7	30.34 +.04	39.2 0.9	38.74 +.01	75.8 3.7
Oct. 6.0	10.68 .09	40.6 0.7	21.64 .13	43.7 2.5	30.40 .06	38.4 0.7	38.80 .11	72.1 3.7
15.9	10.80 .13	41.4 1.0	21.82 .22	41.2 2.3	30.50 .12	37.9 0.4	38.97 .29	68.4 3.7
25.9	10.95 +.18	42.5 —1.2	22.08 +.21	39.1 +1.9	30.66 +.12	37.7 +0.1	39.24 +.29	64.6 —3.7
Nov. 4.9	11.15 .29	43.9 1.5	22.43 .29	37.4 1.5	30.86 .22	37.8 —0.3	39.61 .43	61.0 3.5
14.9	11.39 .25	45.5 1.7	22.86 .46	36.1 1.0	31.10 .26	38.3 0.7	40.09 .59	57.6 3.2
24.8	11.66 .29	47.3 1.9	23.35 .59	35.4 +0.4	31.39 .20	39.2 1.0	40.66 .61	54.6 2.9
Dec. 4.8	11.96 .21	49.3 2.1	23.90 .56	35.3 —0.2	31.70 .23	40.4 1.4	41.31 .68	51.9 2.4
14.8	12.28 +.22	51.4 —2.1	24.47 +.58	35.8 —0.2	32.04 +.24	42.0 —1.7	42.03 +.74	49.7 —1.9
24.8	12.61 .23	53.5 2.1	25.05 .58	36.8 1.2	32.39 .25	43.8 2.0	42.79 .77	48.0 1.2
34.7	12.94 +.22	55.7 —2.0	25.63 +.56	38.5 —1.9	32.73 +.24	45.9 —2.2	43.57 +.78	47.0 —0.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	32 <sup>a</sup> Camelop. (H.)		$\alpha$ Can. Venaticorum.		$\theta$ Virginis.		$\alpha$ Virginis. (Spica.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 12 48	+84° 0'	<sup>h</sup> <sup>m</sup> 12 50	+38° 54'	<sup>h</sup> <sup>m</sup> 13 4	— 4° 56'	<sup>h</sup> <sup>m</sup> 13 19	—10° 34'
Jan. 0.8	13.92+2.23	63.7 -0.8	46.18 +.39	76.4 -1.9	8.15 +.33	20.4 -2.1	16.60 +.33	26.4 -2.0
10.7	16.17 2.34	63.3 -0.2	46.57 .39	74.7 1.4	8.48 .39	22.5 2.0	16.93 .33	26.4 2.0
20.7	18.40 2.18	63.4 +0.5	46.95 .37	73.6 0.9	8.79 .31	24.5 2.0	17.25 .39	30.4 2.0
30.7	20.53 2.05	64.2 1.1	47.30 .34	73.0 -0.3	9.09 .26	26.4 1.8	17.56 .30	32.4 1.9
Feb. 9.6	22.49 1.83	65.7 1.7	47.63 .30	73.0 +0.2	9.36 .26	28.1 1.6	17.84 .27	34.2 1.8
19.6	24.20+1.56	67.7 +2.2	47.91 +.26	73.4 +0.7	9.60 +.22	29.6 -1.4	18.09 +.24	35.9 -1.6
29.6	25.60 1.23	70.1 2.6	48.15 .21	74.4 1.1	9.81 .19	30.8 1.1	18.31 .20	37.4 1.4
Mar. 10.6	26.65 .86	72.9 2.9	48.34 .16	75.7 1.5	9.98 .15	31.8 0.8	18.50 .16	38.7 1.2
20.5	27.33 .48	76.0 3.1	48.48 .11	77.4 1.9	10.11 .11	32.5 0.6	18.64 .13	39.7 0.9
30.5	27.61+ .09	79.1 3.1	48.57 .06	79.4 2.0	10.21 .06	33.0 0.4	18.75 .10	40.5 0.7
Apr. 9.5	27.51- .29	82.2 +3.1	48.60 +.09	81.5 +2.2	10.27 +.05	33.3 -0.2	18.83 +.06	41.1 -0.5
19.5	27.03 .65	85.2 2.9	48.60 -0.2	83.7 2.2	10.30 +.02	33.4 0.0	18.88 .03	41.5 0.3
29.4	26.20 .98	88.0 2.6	48.56 .06	85.9 2.1	10.31 -0.1	33.3 +0.2	18.90 +0.1	41.7 -0.1
May 9.4	25.07 1.26	90.4 2.2	48.48 .09	88.0 2.0	10.29 .03	33.0 0.3	18.90 -0.1	41.8 0.0
19.4	23.68 1.49	92.5 1.8	48.38 .11	89.9 1.8	10.25 .05	32.6 0.4	18.87 .04	41.7 +0.2
29.4	22.08-1.68	94.0 +1.3	48.26 -1.3	91.6 +1.5	10.19 -0.7	32.2 +0.5	18.82 -0.6	41.5 +0.3
June 8.3	20.33 1.80	95.0 0.7	48.11 .15	92.0 1.2	10.11 .06	31.6 0.5	18.75 .06	41.2 0.4
18.3	18.48 1.87	95.5 +0.2	47.96 .16	94.0 0.9	10.02 .09	31.1 0.6	18.67 .09	40.7 0.5
28.3	16.59 1.89	95.4 -0.4	47.79 .17	94.7 0.5	9.92 .10	30.5 0.6	18.57 .10	40.2 0.5
July 8.2	14.70 1.87	94.7 0.9	47.63 .17	95.1 +0.1	9.82 .11	29.8 0.6	18.46 .11	39.6 0.6
18.2	12.86-1.79	93.5 -1.5	47.46 -1.6	95.0 -0.2	9.70 -1.1	29.2 +0.6	18.34 -1.2	39.0 +0.6
28.2	11.12 1.67	91.8 1.9	47.30 .16	94.6 0.6	9.59 .11	28.6 0.6	18.22 .12	38.4 0.7
Aug. 7.2	9.51 1.52	89.6 2.4	47.15 .14	93.8 1.0	9.48 .11	28.0 0.5	18.10 .12	37.7 0.6
17.1	8.08 1.33	87.0 2.8	47.01 .13	92.6 1.3	9.37 .10	27.5 0.5	17.99 .11	37.1 0.6
27.1	6.86 1.11	84.0 3.1	46.89 .10	91.1 1.7	9.28 .06	27.1 0.4	17.88 .09	36.5 0.6
Sept. 6.1	5.87- .85	80.7 -3.4	46.81 -0.7	89.2 -2.1	9.21 -0.6	26.8 +0.2	17.80 -0.7	36.0 +0.5
16.1	5.14 .58	77.2 3.7	46.75 -0.4	87.0 2.2	9.16 -0.3	26.7 0.0	17.73 .04	35.6 0.4
26.0	4.71- .98	73.4 3.8	46.73 +0.1	84.5 2.6	9.15 .00	26.7 -0.2	17.71 -0.1	35.3 +0.2
Oct. 6.0	4.57+ .03	69.6 3.9	46.76 .05	81.8 2.8	9.17 +0.4	27.0 0.4	17.71 +0.3	35.2 0.6
16.0	4.76 .35	65.7 3.8	46.84 .10	78.9 3.0	9.24 .09	27.5 0.6	17.76 .07	35.4 -0.3
25.9	5.28+ .68	61.9 -3.7	46.97 +1.5	75.8 -3.1	9.35 +1.3	28.3 -0.9	17.86 +1.2	35.8 -0.5
Nov. 4.9	6.11 1.01	58.3 3.5	47.15 .21	72.7 3.1	9.50 .18	29.3 1.2	18.01 .17	36.5 0.8
14.9	7.29 1.32	54.8 3.9	47.38 .26	69.6 3.1	9.70 .22	30.6 1.4	18.20 .21	37.5 1.1
24.9	8.75 1.60	51.8 2.9	47.66 .30	66.5 3.0	9.94 .26	32.2 1.7	18.43 .25	38.7 1.4
Dec. 4.8	10.49 1.85	49.1 2.4	47.98 .34	63.6 2.8	10.22 .29	34.0 1.9	18.70 .29	40.2 1.6
14.8	12.45+2.05	47.0 -1.8	48.34 +.37	61.0 -2.5	10.53 +.31	35.9 -2.0	19.01 +.31	41.9 -1.8
24.8	14.58 2.18	45.4 1.2	48.72 .39	58.6 2.1	10.85 .33	38.0 2.1	19.33 .33	43.8 2.0
34.8	16.81+2.26	44.5 -0.6	49.12 +.39	56.7 -1.7	11.18 +.34	40.1 -2.0	19.66 +.34	45.8 -2.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\zeta$ Virginis.		$\eta$ Ursæ Majoris.		$\eta$ Bootis.		$\beta$ Centauri.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 13 28	— 0° 1'	<sup>h</sup> <sup>m</sup> 13 43	+49° 51'	<sup>h</sup> <sup>m</sup> 13 49	+18° 57'	<sup>h</sup> <sup>m</sup> 13 55	—59° 49'
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
Jan. 0.8	58.10 +.32	17.2 -2.1	6.02 +.42	72.1 -2.2	19.83 +.33	33.8 -2.4	54.01 +.55	32.7 -0.5
10.8	58.42 .32	19.3 2.0	6.45 .44	70.1 1.7	20.16 .33	31.5 2.0	54.57 .56	33.4 1.0
20.7	58.74 .31	21.2 1.9	6.89 .43	68.7 1.1	20.50 .33	29.7 1.7	55.13 .55	34.7 1.5
30.7	59.05 .30	23.0 1.7	7.32 .42	67.9 -0.5	20.82 .31	28.1 1.3	55.67 .53	36.3 1.9
Feb. 9.7	59.34 .27	24.6 1.4	7.73 .39	67.7 +0.1	21.13 .29	27.0 0.9	56.18 .49	38.4 2.2
19.7	59.59 +.24	25.9 -1.2	8.10 +.35	68.1 +0.7	21.41 +.27	26.3 -0.5	56.65 +.44	40.8 -2.5
29.6	59.82 .21	26.9 0.9	8.43 .31	69.1 1.3	21.66 .23	26.1 0.0	57.08 .40	43.5 2.7
Mar. 10.6	60.01 .17	27.6 0.6	8.72 .25	70.6 1.7	21.87 .20	26.3 +0.4	57.45 .34	46.3 2.9
20.6	60.16 .14	28.1 0.3	8.94 .20	72.6 2.1	22.05 .16	26.8 0.7	57.76 .28	49.3 3.0
30.5	60.28 .10	28.3 -0.1	9.11 .14	74.8 2.4	22.19 .12	27.7 1.0	58.01 .22	52.3 3.0
Apr. 9.5	60.36 +.07	28.2 +0.2	9.22 +.08	77.4 +2.6	22.29 +.09	28.8 +1.2	58.21 +.16	55.3 -3.0
19.5	60.42 .04	28.0 0.3	9.27 +.03	80.1 2.7	22.36 .05	30.1 1.4	58.34 .10	58.3 2.9
29.5	60.44 +.01	27.5 0.5	9.28 -.02	82.8 2.7	22.40 +.02	31.6 1.5	58.41 +.04	61.2 2.8
May 9.4	60.45 -.01	27.0 0.6	9.23 .07	85.4 2.6	22.41 -.01	33.2 1.5	58.43 -.02	63.8 2.6
19.4	60.42 .03	26.4 0.7	9.14 .11	87.9 2.3	22.39 .03	34.7 1.5	58.38 .07	66.3 2.3
29.4	60.38 -.05	25.7 +0.7	9.01 -.14	90.1 +2.1	22.35 -.05	36.2 +1.4	58.28 -.12	68.5 -2.0
June 8.4	60.32 .07	25.0 0.7	8.85 .17	92.0 1.7	22.28 .07	37.6 1.3	58.14 .17	70.4 1.7
18.3	60.24 .09	24.3 0.7	8.66 .20	93.5 1.3	22.20 .09	38.8 1.1	57.94 .22	71.8 1.3
28.3	60.14 .10	23.6 0.7	8.45 .22	94.7 0.9	22.10 .11	39.9 0.9	57.70 .26	73.0 0.9
July 8.3	60.04 .11	22.9 0.6	8.22 .23	95.4 +0.5	21.98 .12	40.7 0.7	57.42 .29	73.7 -0.5
18.2	59.92 -.12	22.3 +0.6	7.98 -.24	95.6 0.0	21.85 -.13	41.3 +0.5	57.10 -.31	74.0 0.0
28.2	59.80 .12	21.8 0.5	7.74 .24	95.4 -0.4	21.72 .14	41.6 +0.2	56.79 .33	73.8 +0.4
Aug. 7.2	59.68 .12	21.4 0.4	7.50 .23	94.7 0.9	21.58 .14	41.7 -0.1	56.46 .33	73.2 0.8
17.2	59.57 .11	21.0 0.3	7.27 .22	93.6 1.4	21.44 .13	41.5 0.3	56.13 .32	72.1 1.2
27.1	59.46 .10	20.8 +0.1	7.06 .20	92.0 1.8	21.31 .12	41.0 0.6	55.82 .29	70.7 1.6
Sept. 6.1	59.37 -.08	20.8 0.0	6.87 -.17	90.1 -2.2	21.20 -.10	40.2 -0.9	55.55 -.26	68.9 +1.9
16.1	59.30 .05	20.9 -0.2	6.72 .13	87.7 2.5	21.10 .08	39.2 1.2	55.32 .20	66.8 2.2
26.1	59.26 -.02	21.2 0.4	6.60 .09	85.0 2.9	21.04 .05	37.9 1.5	55.16 .13	64.5 2.3
Oct. 6.0	59.26 +.02	21.8 0.6	6.54 -.04	82.0 3.1	21.01 -.01	36.3 1.7	55.06 -.06	62.1 2.4
16.0	59.30 .06	22.6 0.9	6.53 +.02	78.7 3.4	21.02 +.03	34.4 2.0	55.06 +.04	59.7 2.4
26.0	59.38 +.11	23.6 -1.2	6.58 +.08	75.2 -3.5	21.08 +.08	32.3 -2.2	55.14 +.13	57.4 +2.2
Nov. 4.9	59.51 .15	24.9 1.4	6.69 .15	71.7 3.6	21.18 .13	29.9 2.4	55.31 .22	55.3 2.0
14.9	59.63 .20	26.4 1.6	6.87 .21	68.1 3.5	21.34 .18	27.4 2.6	55.57 .30	53.4 1.7
24.9	59.91 .24	28.2 1.8	7.12 .27	64.6 3.4	21.54 .22	24.8 2.7	55.91 .38	51.9 1.3
Dec. 4.9	60.17 .27	30.1 2.0	7.42 .33	61.2 3.2	21.78 .26	22.1 2.7	56.33 .45	50.9 0.8
14.8	60.46 +.20	32.2 -2.1	7.78 +.28	58.1 -2.9	22.06 +.22	19.4 -2.6	56.81 +.50	50.3 +0.3
24.8	60.77 .22	34.3 2.1	8.18 .41	55.4 2.5	22.37 .22	16.9 2.5	57.33 .54	50.3 -0.2
34.8	61.09 +.22	36.4 -2.1	8.60 +.43	53.1 -2.1	22.70 +.23	14.5 -2.2	57.88 +.56	50.7 -0.7



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	<i><math>\alpha</math> Draconis.</i>		<i><math>\alpha</math> Bootis. (Arcturus.)</i>		<i><math>\theta</math> Bootis.</i>		<i><math>\rho</math> Bootis.</i>	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 14	<sup>m</sup> 1	<sup>h</sup> 14	<sup>m</sup> 10	<sup>h</sup> 14	<sup>m</sup> 21	<sup>h</sup> 14	<sup>m</sup> 26
		+64° 54'		+19° 45'		+52° 21'		+30° 51'
Jan. 0.8	19.13	+57	31.78	+39	21.15	+41	58.67	+39
10.8	19.72	.60	32.10	.39	21.57	.44	59.00	.34
20.8	20.33	.61	32.43	.33	22.02	.45	59.35	.35
30.7	20.94	.60	32.76	.39	22.47	.44	59.70	.34
Feb. 9.7	21.53	.57	33.07	.30	22.91	.43	60.03	.33
19.7	22.08	+59	33.36	+37	23.32	+40	60.35	+31
29.6	22.58	.46	33.62	.25	23.70	.36	60.64	.27
Mar. 10.6	23.00	.39	33.85	.21	24.03	.31	60.90	.24
20.6	23.35	.31	34.04	.18	24.32	.26	61.13	.20
30.6	23.62	.28	34.20	.14	24.54	.20	61.31	.17
Apr. 9.5	23.79	+13	34.33	+11	24.71	+14	61.46	+13
19.5	23.88	+04	34.42	.07	24.82	.08	61.57	.00
29.5	23.87	-.04	34.47	.04	24.88	+03	61.64	.05
May 9.5	23.79	.19	34.50	+01	24.67	-.03	61.68	+02
19.4	23.63	.19	34.50	-.09	24.82	.08	61.68	-.01
29.4	23.41	-.25	34.47	-.04	24.72	-.19	61.65	-.04
June 8.4	23.12	.31	34.41	.07	24.58	.16	61.59	.07
18.3	22.80	.35	34.33	.00	24.40	.30	61.50	.10
28.3	22.43	.36	34.24	.11	24.19	.23	61.39	.12
July 8.3	22.03	.41	34.12	.12	23.95	.25	61.26	.14
18.3	21.61	-.42	33.99	-.14	23.69	-.27	61.11	-.16
28.2	21.19	.42	33.85	.15	23.42	.28	60.94	.17
Aug. 7.2	20.76	.42	33.70	.15	23.14	.28	60.77	.18
17.2	20.35	.40	33.55	.15	22.86	.27	60.59	.18
27.2	19.97	.37	33.41	.14	22.59	.26	60.42	.17
Sept. 6.1	19.62	-.33	33.27	-.12	22.34	-.23	60.26	-.15
16.1	19.32	.27	33.16	.10	22.12	.20	60.11	.13
26.1	19.07	.21	33.07	.07	21.94	.16	60.00	.10
Oct. 6.0	18.90	.14	33.02	-.03	21.80	.11	59.91	.06
16.0	18.80	-.05	33.00	+01	21.72	-.05	59.87	-.02
26.0	18.79	+05	33.03	+06	21.70	+01	59.87	+03
Nov. 5.0	18.87	.13	33.11	.10	21.75	.07	59.93	.08
14.9	19.05	.29	33.24	.15	21.87	.15	60.04	.14
24.9	19.32	.31	33.42	.20	22.06	.22	60.21	.19
Dec. 4.9	19.69	.40	33.65	.24	22.32	.29	60.42	.24
14.9	20.13	+48	33.91	+28	22.64	+34	60.69	+28
24.8	20.64	.54	34.21	.31	23.01	.39	60.98	.31
34.8	21.21	+59	34.52	+29	23.42	+43	61.31	+34



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	5 Ursæ Minoris.		α Centauri.		ε Bootis.		α Libræ.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 14 27	+76° 11'	<sup>h</sup> <sup>m</sup> 14 31	−60° 22'	<sup>h</sup> <sup>m</sup> 14 40	+27° 32'	<sup>h</sup> <sup>m</sup> 14 44	−15° 34'
Jan. 0.8	42.19 +.85	27.9 −2.4	59.12 +.53	9.0 0.0	4.19 +.31	46.7 −2.6	39.46 +.39	21.8 −1.5
10.8	43.10 .94	25.8 1.8	59.67 .55	9.2 −0.5	4.51 .33	44.3 2.3	39.79 .39	23.4 1.6
20.8	44.08 .99	24.3 1.1	60.22 .55	10.0 1.0	4.85 .34	42.2 1.9	40.11 .33	25.1 1.7
30.7	45.08 1.00	23.5 −0.5	60.78 .54	11.2 1.4	5.19 .33	40.5 1.4	40.44 .39	26.7 1.6
Feb. 9.7	46.08 .98	23.4 +0.9	61.31 .52	12.8 1.8	5.52 .32	39.3 0.9	40.76 .31	28.4 1.6
19.7	47.04 +.92	24.0 +0.9	61.82 +.49	14.7 −2.1	5.83 +.30	38.6 −0.4	41.06 +.29	29.9 −1.5
29.7	47.92 .84	25.1 1.5	62.29 .44	17.0 2.4	6.13 .28	38.4 +0.1	41.34 .27	31.3 1.3
Mar. 10.6	48.71 .79	26.9 2.0	62.71 .40	19.4 2.6	6.39 .25	38.8 0.5	41.59 .24	32.6 1.2
20.6	49.37 .58	29.2 2.5	63.08 .34	22.1 2.7	6.62 .21	39.5 1.0	41.82 .21	33.7 1.0
30.6	49.88 .44	31.8 2.8	63.40 .29	24.9 2.8	6.81 .18	40.7 1.4	42.02 .18	34.6 0.8
Apr. 9.6	50.24 +.28	34.8 +3.0	63.66 +.23	27.7 −2.8	6.97 +.14	42.3 +1.7	42.19 +.15	35.3 −0.6
19.5	50.43 +.12	37.9 3.1	63.85 .17	30.6 2.8	7.09 .10	44.1 1.9	42.32 .12	35.9 0.5
29.5	50.47 −.04	41.0 3.1	63.99 .11	33.3 2.7	7.18 .07	46.0 2.0	42.43 .09	36.3 0.3
May 9.5	50.35 .19	44.1 3.0	64.06 +.05	36.0 2.6	7.23 +.04	48.1 2.1	42.51 .06	36.5 0.2
19.4	50.08 .33	47.0 2.8	64.08 −.02	38.6 2.4	7.25 .00	50.2 2.1	42.56 .04	36.7 −0.1
29.4	49.68 −.46	49.7 +2.5	64.03 −.07	40.9 −2.2	7.24 −.03	52.2 +2.0	42.58 +.01	36.7 0.0
June 8.4	49.16 .57	52.0 2.1	63.93 .13	43.0 2.0	7.20 .06	54.1 1.8	42.58 −.02	36.6 +0.1
18.4	48.53 .67	53.8 1.6	63.77 .19	44.8 1.7	7.12 .06	55.8 1.6	42.54 .05	36.5 0.2
28.3	47.83 .74	55.2 1.1	63.55 .24	46.3 1.3	7.03 .11	57.3 1.3	42.48 .07	36.3 0.2
July 8.3	47.05 .80	56.1 0.6	63.29 .28	47.4 0.9	6.91 .13	58.5 1.1	42.40 .10	36.0 0.3
18.3	46.23 −.83	56.5 +0.1	62.99 −.32	48.0 −0.4	6.77 −.15	59.4 +0.7	42.29 −.12	35.7 +0.4
28.3	45.38 .85	56.4 −0.4	62.66 .34	48.2 0.0	6.61 .16	60.0 0.4	42.17 .13	35.3 0.4
Aug. 7.2	44.53 .84	55.7 0.9	62.30 .36	48.0 +0.4	6.44 .17	60.3 +0.1	42.03 .14	34.8 0.5
17.2	43.70 .89	54.5 1.5	61.95 .35	47.4 0.8	6.27 .17	60.1 −0.3	41.88 .15	34.3 0.5
27.2	42.90 .77	52.8 1.9	61.60 .34	46.3 1.3	6.10 .17	59.7 0.6	41.73 .15	33.8 0.5
Sept. 6.1	42.15 −.71	50.6 −2.4	61.26 −.31	44.9 +1.6	5.94 −.16	58.9 −1.0	41.58 −.14	33.3 +0.5
16.1	41.67 .63	48.0 2.8	60.98 .25	43.1 1.9	5.79 .14	57.7 1.3	41.46 .12	32.9 0.4
26.1	40.90 .52	45.0 3.2	60.74 .21	41.0 2.1	5.66 .11	56.2 1.7	41.35 .09	32.5 0.3
Oct. 6.1	40.43 .40	41.6 3.5	60.57 .13	38.8 2.3	5.57 .07	54.4 2.0	41.28 .06	32.2 0.2
16.0	40.09 .27	38.0 3.7	60.48 −.04	36.4 2.3	5.52 −.03	52.2 2.3	41.24 −.01	32.0 +0.1
26.0	39.89 −.12	34.3 −3.8	60.49 +.05	34.1 +2.3	5.51 +.02	49.8 −2.6	41.26 +.04	32.0 −0.1
Nov. 5.0	39.85 +.02	30.4 3.8	60.58 .14	31.8 2.2	5.56 .07	47.1 2.8	41.32 .09	32.3 0.3
15.0	39.98 .21	26.5 3.8	60.77 .23	29.8 1.9	5.66 .12	44.2 2.9	41.43 .14	32.7 0.6
24.9	40.27 .27	22.7 3.7	61.05 .29	28.0 1.6	5.81 .17	41.2 3.0	41.60 .19	33.4 0.8
Dec. 4.9	40.73 .53	19.0 3.5	61.41 .40	26.6 1.2	6.01 .22	38.2 3.0	41.81 .23	34.3 1.1
14.9	41.33 +.67	15.7 −3.1	61.84 +.46	25.6 +0.7	6.25 +.26	35.2 −2.9	42.06 +.27	35.6 −1.3
24.8	42.07 .80	12.8 2.7	62.33 .51	25.1 +0.3	6.54 .30	32.3 2.7	42.35 .30	36.9 1.5
34.8	42.93 +.21	10.3 −2.1	62.86 +.54	25.1 0.0	6.85 +.22	29.6 −2.5	42.66 +.22	38.5 −1.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Ursæ Minoris.		$\beta$ Bootis.		$\beta$ Libræ.		$\mu$ Bootis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 14 <sup>m</sup> 50	<sup>°</sup> +74 <sup>'</sup> 36	<sup>h</sup> 14 <sup>m</sup> 57	<sup>°</sup> +40 <sup>'</sup> 49	<sup>h</sup> 15 <sup>m</sup> 10	<sup>°</sup> - 8 <sup>'</sup> 57	<sup>h</sup> 15 <sup>m</sup> 20	<sup>°</sup> +37 <sup>'</sup> 45
Jan. 0.8	58.38 +.73	38.8 -2.6	41.79 +.33	53.4 -2.9	57.20 +.29	59.7 -1.7	13.68 +.30	70.9 -2.9
10.8	59.16 .81	36.4 2.1	42.14 .35	50.8 2.4	57.50 .31	-61.4 1.7	14.00 .33	68.1 2.6
20.8	60.01 .87	34.6 1.5	42.50 .37	48.6 2.0	57.81 .39	63.1 1.7	14.34 .35	65.7 2.1
30.8	60.91 .90	33.4 0.8	42.88 .37	46.9 1.4	58.13 .31	64.7 1.6	14.70 .36	63.8 1.6
Feb. 9.7	61.81 .90	33.0 -0.1	43.25 .36	45.7 0.8	58.44 .30	66.2 1.4	15.05 .35	62.5 1.1
19.7	62.70 +.86	33.2 +0.5	43.61 +.35	45.2 -0.2	58.74 +.29	67.6 -1.3	15.41 +.34	61.7 -0.5
29.7	63.53 .90	34.1 1.2	43.95 .39	45.2 +0.3	59.03 .27	68.8 1.1	15.74 .32	61.5 +0.1
Mar. 10.7	64.29 .71	35.5 1.7	44.25 .39	45.9 0.9	59.29 .25	69.7 0.8	16.05 .30	61.9 0.6
20.6	64.94 .60	37.5 2.2	44.53 .25	47.0 1.4	59.53 .23	70.5 0.6	16.33 .26	62.8 1.2
30.6	65.48 .47	40.0 2.6	44.76 .21	48.7 1.9	59.75 .20	71.0 0.4	16.58 .23	64.2 1.6
Apr. 9.6	65.88 +.33	42.8 +2.9	44.95 +.17	50.7 +2.2	59.93 +.17	71.3 -0.9	16.79 +.19	66.0 +2.0
19.5	66.14 .19	45.9 3.1	45.10 .13	53.0 2.4	60.09 .14	71.4 0.0	16.96 .15	68.2 2.3
29.5	66.26 +.05	49.0 3.1	45.21 .08	55.5 2.6	60.22 .12	71.3 +0.1	17.09 .11	70.6 2.5
May 9.5	66.23 -.09	52.2 3.1	45.27 +.04	58.1 2.6	60.33 .09	71.2 0.2	17.18 .07	73.1 2.6
19.5	66.07 .22	55.2 2.9	45.29 .00	60.7 2.6	60.40 .06	70.9 0.3	17.23 +.03	75.7 2.6
29.4	65.78 -.34	58.0 +2.7	45.27 -.04	63.3 +2.4	60.44 +.03	70.5 +0.4	17.23 -.01	78.2 +2.5
June 8.4	65.38 .46	60.5 2.3	45.21 .08	65.6 2.2	60.46 .00	70.1 0.4	17.21 .05	80.7 2.3
18.4	64.87 .55	62.7 1.9	45.12 .11	67.7 2.0	60.45 -.03	69.6 0.5	17.14 .08	82.9 2.1
28.4	64.28 .63	64.4 1.5	44.99 .14	69.5 1.7	60.40 .06	69.1 0.5	17.04 .12	84.8 1.8
July 8.3	63.61 .69	65.6 1.0	44.83 .17	71.0 1.3	60.33 .08	68.7 0.5	16.91 .15	86.4 1.5
18.3	62.89 -.74	66.3 +0.5	44.65 -.19	72.1 +0.9	60.24 -.11	68.2 +0.4	16.75 -.17	87.7 +1.1
28.3	62.14 .77	66.5 -0.1	44.45 .21	72.8 +0.5	60.12 .13	67.8 0.4	16.56 .19	88.6 0.7
Aug. 7.2	61.36 .78	66.2 0.6	44.24 .22	73.0 0.0	59.98 .14	67.3 0.4	16.36 .21	89.1 +0.3
17.2	60.58 .77	65.3 1.1	44.01 .22	72.8 -0.4	59.84 .15	66.9 0.4	16.14 .22	89.2 -0.1
27.2	59.82 .74	64.0 1.6	43.79 .22	72.2 0.8	59.68 .15	66.6 0.3	15.92 .22	88.9 0.6
Sept. 6.2	59.10 -.69	62.1 -2.1	43.57 -.21	71.1 -1.3	59.53 -.14	66.3 +0.2	15.70 -.21	88.1 -1.0
16.1	58.43 .63	59.8 2.5	43.37 .19	69.7 1.7	59.40 .13	66.1 +0.1	15.50 .20	86.9 1.4
26.1	57.84 .54	57.0 2.9	43.20 .16	67.8 2.1	59.27 .11	66.1 0.0	15.31 .17	85.3 1.8
Oct. 6.1	57.35 .44	53.9 3.3	43.05 .12	65.5 2.5	59.18 .08	66.1 -0.1	15.16 .14	83.3 2.2
16.1	56.96 .39	50.5 3.5	42.96 .07	62.8 2.8	59.12 -.04	66.3 0.3	15.04 .09	80.9 2.5
26.0	56.70 -.19	46.8 -3.7	42.91 -.02	59.9 -3.1	59.11 +.01	66.7 -0.5	14.97 -.04	78.2 -2.8
Nov. 5.0	56.58 -.05	43.0 3.9	42.92 +.04	56.7 3.3	59.14 .06	67.3 0.7	14.95 +.01	75.2 3.1
15.0	56.61 +.10	39.1 3.9	42.98 .10	53.4 3.4	59.23 .11	68.1 0.9	14.99 .07	72.0 3.3
24.9	56.78 .26	35.2 3.8	43.11 .16	49.9 3.5	59.36 .16	69.2 1.1	15.09 .13	68.7 3.4
Dec. 4.9	57.12 .40	31.5 3.6	43.30 .21	46.4 3.4	59.54 .20	70.4 1.3	15.25 .18	65.3 3.4
14.9	57.59 +.54	28.0 -3.3	43.54 +.26	43.1 -3.3	59.77 +.24	71.8 -1.5	15.46 +.24	61.9 -3.3
24.9	58.20 .67	24.8 2.9	43.83 .31	39.9 3.1	60.03 .28	73.4 1.6	15.72 .28	58.7 3.1
34.8	58.93 +.78	22.1 -2.4	44.16 +.34	37.0 -2.8	60.32 +.30	75.1 -1.7	16.02 +.28	55.7 -2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma^2$ Ursæ Minoris.		$\alpha$ Coronæ Borealis.		$\alpha$ Serpentis.		$\epsilon$ Serpentis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 15 <sup>m</sup> 20	+72° 13'	<sup>h</sup> 15 <sup>m</sup> 29	+27° 5'	<sup>h</sup> 15 <sup>m</sup> 38	+ 6° 46'	<sup>h</sup> 15 <sup>m</sup> 45	+ 4° 48'
Jan. 0.9	50.94 +.57	50.1 -3.0	54.97 +.98	31.4 -2.8	43.35 +.96	47.4 -2.2	12.24 +.96	61.2 -2.1
10.8	51.57 .67	47.4 2.4	55.26 .30	28.7 2.5	43.62 .39	45.3 2.1	12.51 .38	59.1 2.0
20.8	52.28 .73	45.2 1.9	55.57 .32	26.4 2.2	43.92 .30	43.3 1.9	12.80 .30	57.2 1.8
30.8	53.04 .77	43.6 1.3	55.90 .33	24.4 1.7	44.22 .31	41.5 1.7	13.11 .30	55.4 1.6
Feb. 9.8	53.83 .79	42.7 -0.6	56.23 .33	22.9 1.3	44.53 .30	39.9 1.4	13.41 .30	53.9 1.4
19.7	54.61 +.77	42.5 +0.1	56.55 +.31	21.9 -0.7	44.83 +.30	38.7 -1.0	13.71 +.29	52.6 -1.1
29.7	55.37 .73	42.9 0.8	56.86 .30	21.4 -0.2	45.12 .28	37.8 0.7	14.00 .26	51.7 0.7
Mar. 10.7	56.08 .67	44.0 1.4	57.15 .28	21.4 +0.3	45.40 .26	37.3 -0.3	14.28 .27	51.2 -0.4
20.6	56.71 .59	45.7 1.9	57.41 .25	21.9 0.8	45.65 .24	37.2 0.0	14.53 .24	51.0 0.0
30.6	57.25 .49	47.9 2.4	57.65 .22	22.9 1.2	45.88 .22	37.4 +0.3	14.77 .22	51.1 +0.3
Apr. 9.6	57.69 +.38	50.4 +2.7	57.85 +.19	24.3 +1.6	46.08 +.19	37.9 +0.6	14.97 +.20	51.5 +0.6
19.6	58.01 .26	53.4 3.0	58.03 .15	26.1 1.8	46.26 .16	38.7 0.9	15.16 .17	52.2 0.8
29.5	58.21 .14	56.5 3.1	58.17 .12	28.0 2.0	46.40 .13	39.6 1.1	15.31 .14	53.1 1.0
May 9.5	58.28 +.02	59.6 3.2	58.27 .09	30.1 2.2	46.53 .11	40.8 1.2	15.44 .11	54.1 1.1
19.5	58.24 -10	62.8 3.1	58.34 .05	32.3 2.2	46.62 .08	42.0 1.3	15.54 .08	55.3 1.2
29.5	58.08 -.31	65.8 +2.9	58.37 +.02	31.5 +2.2	46.68 +.05	43.3 +1.3	15.61 +.05	56.5 +1.2
June 8.4	57.81 .32	68.5 2.6	58.37 -.02	36.7 2.1	46.71 +.01	44.6 1.3	15.64 +.02	57.7 1.2
18.4	57.45 .41	71.0 2.3	58.34 .05	38.7 1.9	46.71 -.02	45.9 1.2	15.65 -.01	58.9 1.1
28.4	56.99 .49	73.1 1.8	58.28 .08	40.4 1.7	46.67 .05	47.0 1.1	15.63 .04	60.0 1.0
July 8.3	56.46 .56	74.7 1.4	58.18 .11	42.0 1.4	46.61 .07	48.1 1.0	15.57 .07	61.0 0.9
18.3	55.86 -.62	75.9 +0.9	58.06 -.14	43.2 +1.1	46.53 -.10	49.0 +0.8	15.49 -.10	61.9 +0.8
28.3	55.22 .66	76.5 +0.4	57.91 .16	44.2 0.8	46.41 .12	49.7 0.7	15.38 .12	62.6 0.7
Aug. 7.3	54.55 .68	76.7 -0.1	57.74 .17	44.8 0.4	46.28 .14	50.3 0.5	15.24 .14	63.2 0.5
17.2	53.86 .69	76.3 0.7	57.56 .18	45.0 +0.1	46.13 .15	50.7 0.3	15.10 .15	63.6 0.3
27.2	53.17 .68	75.4 1.9	57.37 .19	45.0 -0.3	45.97 .16	50.9 +0.1	14.94 .16	63.8 +0.1
Sept. 6.2	52.50 -.65	74.0 -1.7	57.18 -.18	44.5 -0.6	45.81 -.16	50.9 -0.1	14.77 -.16	63.8 -0.1
16.2	51.86 .61	72.1 2.1	57.00 .17	43.6 1.0	45.65 .15	50.6 0.4	14.61 .15	63.6 0.3
26.1	51.28 .55	69.7 2.6	56.84 .15	42.4 1.4	45.51 .13	50.1 0.6	14.47 .13	63.2 0.5
Oct. 6.1	50.77 .47	66.9 3.0	56.70 .12	40.9 1.7	45.39 .10	49.4 0.8	14.35 .11	62.6 0.7
16.1	50.35 .37	63.7 3.3	56.60 .08	39.0 2.1	45.31 .07	48.4 1.1	14.26 .07	61.8 1.0
26.0	50.03 -.28	60.3 -3.6	56.54 -.04	36.7 -2.4	45.26 -.02	47.2 -1.3	14.21 -.03	60.7 -1.2
Nov. 5.0	49.83 -.13	56.6 3.8	56.53 +.01	34.2 2.6	45.26 +.02	45.8 1.6	14.21 +.02	59.3 1.4
15.0	49.76 .00	52.8 3.9	56.57 .06	31.5 2.8	45.31 .07	44.1 1.8	14.25 .07	57.8 1.7
25.0	49.83 +.13	48.9 3.9	56.66 .12	28.5 3.0	45.41 .12	42.2 2.0	14.34 .12	56.0 1.8
Dec. 4.9	50.03 .27	45.1 3.8	56.81 .17	25.5 3.1	45.55 .17	40.1 2.1	14.48 .16	54.1 2.0
14.9	50.36 +.40	41.4 -3.6	57.01 +.22	22.4 -3.0	45.74 +.21	38.0 -2.2	14.67 +.21	52.0 -2.1
24.9	50.83 .52	37.9 3.2	57.25 .26	19.5 2.9	45.98 .25	35.7 2.2	14.90 .24	49.9 2.1
34.9	51.40 +.64	34.9 -2.8	57.52 +.29	16.6 -2.7	46.24 +.26	33.5 -2.2	15.16 +.28	47.7 -2.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\zeta$ Ursæ Minoris.		$\epsilon$ Coronæ Borealis.		$\delta$ Scorpii.		$\beta^1$ Scorpii.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 15 47	<sup>m</sup> +78° 7'	<sup>h</sup> 15 52	<sup>m</sup> +27° 11'	<sup>h</sup> 15 53	<sup>m</sup> -22° 17'	<sup>h</sup> 15 58	<sup>m</sup> -19° 29'
Jan. 0.9	59.02+ .70	73.4 -3.1	55.22 +.26	70.2 -2.9	40.79 +.28	56.0 -0.8	53.61 +.27	42.5 -1.0
10.9	59.80 .86	70.6 2.6	55.49 .29	67.4 2.6	41.09 .31	56.9 1.0	53.90 .30	43.5 1.1
20.8	60.73 .98	68.2 2.1	55.79 .31	65.0 2.3	41.40 .32	58.0 1.1	54.21 .32	44.6 1.2
30.8	61.76 1.06	66.3 1.5	56.11 .32	62.9 1.9	41.73 .33	59.2 1.2	54.53 .32	45.8 1.2
Feb. 9.8	62.86 1.11	65.2 0.9	56.43 .32	61.3 1.4	42.06 .33	60.3 1.2	54.85 .32	47.0 1.2
19.7	63.99+1.19	64.6 -0.2	56.76 +.22	60.1 -0.9	42.39 +.32	61.5 -1.2	55.17 +.32	48.2 -1.1
29.7	65.10 1.09	64.8 +0.5	57.07 .30	59.5 -0.4	42.70 .31	62.7 1.1	55.49 .31	49.2 1.0
Mar. 10.7	66.16 1.02	65.6 1.1	57.37 .29	59.4 +0.2	43.01 .29	63.7 1.0	55.79 .29	50.2 0.9
20.7	67.14 .92	67.0 1.7	57.64 .28	59.8 0.7	43.29 .27	64.7 0.9	56.07 .27	51.1 0.8
30.6	68.00 .78	69.0 2.2	57.90 .24	60.7 1.1	43.55 .25	65.6 0.8	56.33 .25	51.9 0.7
Apr. 9.6	68.71+ .63	71.4 +2.6	58.12 +.21	62.1 +1.5	43.79 +.22	66.3 -0.7	56.56 +.23	52.4 -0.6
19.6	69.26 .46	74.1 2.9	58.31 .18	63.7 1.8	44.00 .20	67.0 0.6	56.78 .20	53.0 0.5
29.6	69.63 .28	77.2 3.1	58.47 .15	65.7 2.0	44.19 .17	67.6 0.5	56.96 .17	53.4 0.3
May 9.5	69.82+ .10	80.3 3.2	58.60 .11	67.8 2.2	44.34 .14	68.0 0.4	57.12 .14	53.6 0.2
19.5	69.82- .09	83.5 3.1	58.70 .08	70.1 2.3	44.47 .11	68.4 0.4	57.25 .11	53.9 0.2
29.5	69.64- .26	86.6 +3.0	58.75 +.04	72.4 +2.3	44.56 +.08	68.8 -0.3	57.35 +.08	54.0 -0.1
June 8.4	69.30 .43	89.5 2.8	58.77 .00	74.6 2.2	44.62 .04	69.1 0.2	57.41 .06	54.1 -0.1
18.4	68.78 .58	92.1 2.5	58.76 -.03	76.7 2.0	44.65 +.01	69.3 0.2	57.44 +.01	54.2 0.0
28.4	68.13 .72	94.4 2.1	58.71 .07	78.6 1.8	44.63 -.03	69.4 0.1	57.43 -.02	54.2 0.0
July 8.4	67.35 .84	96.3 1.7	58.63 .10	80.4 1.6	44.59 .06	69.5 -0.1	57.39 .06	54.2 +0.1
18.3	66.45- .24	97.7 +1.2	58.51 -.13	81.8 +1.3	44.51 -.09	69.5 0.0	57.32 -.09	54.1 +0.1
28.3	65.48 1.01	98.7 0.7	58.37 .15	82.9 1.0	44.40 .12	69.5 +0.1	57.21 .12	54.0 0.1
Aug. 7.3	64.44 1.06	99.1 +0.2	58.21 .18	83.7 0.6	44.26 .15	69.3 0.2	57.08 .14	53.8 0.2
17.3	63.36 1.09	99.1 -0.3	58.02 .19	84.1 +0.2	44.11 .16	69.1 0.2	56.93 .16	53.6 0.2
27.2	62.27 1.09	98.5 0.8	57.83 .20	84.2 -0.1	43.94 .17	68.8 0.3	56.76 .17	53.3 0.3
Sept. 6.2	61.18-1.06	97.4 -1.3	57.63 -.19	83.9 -0.5	43.76 -.17	68.5 +0.4	56.59 -.17	53.0 +0.3
16.2	60.14 1.01	95.8 1.8	57.44 .19	83.2 0.9	43.59 .16	68.1 0.4	56.42 .16	52.7 0.3
26.1	59.16 .93	93.7 2.3	57.26 .17	82.2 1.2	43.44 .14	67.6 0.5	56.27 .14	52.3 0.3
Oct. 6.1	58.28 .83	91.2 2.7	57.10 .14	80.7 1.6	43.31 .11	67.2 0.4	56.14 .12	52.0 0.3
16.1	57.50 .70	88.3 3.1	56.98 .10	79.0 2.0	43.21 .08	66.8 0.4	56.04 .08	51.7 0.3
26.1	56.88- .55	85.0 -3.4	56.90 -.06	76.8 -2.3	43.16 -.03	66.4 +0.3	55.98 -.04	51.5 +0.1
Nov. 5.0	56.41 .38	81.5 3.6	56.86 -.01	74.4 2.5	43.15 +.02	66.2 +0.2	55.97 +.02	51.5 0.0
15.0	56.12- .19	77.8 3.8	56.87 +.04	71.8 2.8	43.20 .07	66.1 0.0	56.01 .07	51.5 -0.2
25.0	56.03+ .01	74.0 3.8	56.94 .09	68.9 2.2	43.30 .13	66.2 -0.2	56.11 .13	51.8 0.4
Dec. 5.0	56.14 .21	70.2 3.8	57.06 .15	65.9 2.0	43.46 .18	66.5 0.4	56.25 .17	52.2 0.5
14.9	56.45+ .41	66.5 -3.8	57.23 +.19	62.8 -3.0	43.66 +.23	67.0 -0.6	56.45 +.23	52.9 -0.7
24.9	56.95 .59	63.0 3.3	57.45 .24	59.8 2.2	43.91 .28	67.7 0.8	56.69 .28	53.7 0.9
34.9	57.64+ .77	59.8 -3.0	57.70 +.27	56.9 -2.8	44.19 +.30	68.6 -0.9	56.96 +.29	54.7 -1.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	Groombridge 2320.		$\delta$ Ophiuchi.		$\tau$ Herculis.		$\alpha$ Scorpii. (Antares.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 16	<sup>m</sup> 5	<sup>h</sup> 16	<sup>m</sup> 8	<sup>h</sup> 16	<sup>m</sup> 16	<sup>h</sup> 16	<sup>m</sup> 22
		+68° 6'		— 3° 24'		+46° 34'		—26° 10'
Jan. 0.9	57.48 +.41	15.0 —3.3	26.73 +.24	11.7 —1.7	20.22 +.26	47.4 —3.3	30.34 +.27	45.8 —0.5
10.9	57.93 .48	11.9 2.9	26.99 .27	13.4 1.7	20.51 .31	44.3 3.0	30.62 .30	46.4 0.6
20.8	58.45 .55	9.2 2.4	27.27 .29	15.1 1.6	20.84 .34	41.4 2.6	30.93 .32	47.1 0.8
30.8	59.04 .61	7.0 1.9	27.57 .30	16.6 1.5	21.19 .37	39.1 2.1	31.26 .33	47.9 0.9
Feb. 9.8	59.67 .64	5.4 1.2	27.88 .30	18.0 1.3	21.57 .38	37.3 1.5	31.60 .34	48.8 0.9
19.8	60.31 +.65	4.5 —0.6	28.18 +.30	19.3 —1.1	21.96 +.38	36.1 —0.9	31.93 +.33	49.8 —0.9
29.7	60.96 .63	4.3 +0.1	28.48 .29	20.2 0.8	22.34 .38	35.5 —0.3	32.26 .32	50.7 0.9
Mar. 10.7	61.58 .60	4.8 0.8	28.76 .28	20.9 0.6	22.71 .36	35.6 +0.4	32.59 .31	51.6 0.9
20.7	62.16 .55	5.9 1.4	29.03 .26	21.3 —0.3	23.06 .34	36.3 1.0	32.89 .30	52.5 0.8
30.7	62.69 .49	7.6 1.9	29.28 .24	21.5 0.0	23.38 .31	37.5 1.5	33.18 .28	53.3 0.8
Apr. 9.6	63.14 +.41	9.8 +2.4	29.50 +.22	21.4 +0.2	23.67 +.27	39.3 +2.0	33.45 +.26	54.0 —0.7
19.6	63.51 .33	12.4 2.8	29.71 .19	21.1 0.4	23.92 .23	41.5 2.4	33.69 .23	54.7 0.7
29.6	63.79 .23	15.3 3.0	29.89 .17	20.6 0.6	24.13 .18	44.0 2.7	33.91 .20	55.3 0.6
May 9.5	63.98 .14	18.5 3.2	30.04 .14	20.0 0.7	24.28 .13	46.8 2.8	34.10 .17	55.9 0.6
19.5	64.06 +.04	21.7 3.2	30.16 .11	19.2 0.8	24.39 .09	49.7 2.9	34.26 .14	56.4 0.5
29.5	64.05 —.06	24.9 +3.1	30.26 +.08	18.4 +0.8	24.46 +.04	52.7 +2.9	34.39 +.11	56.0 —0.5
June 8.5	63.95 .16	27.9 2.9	30.32 .05	17.6 0.8	24.47 —.01	55.6 2.8	34.47 .07	57.4 0.4
18.4	63.75 .24	30.8 2.7	30.35 +.01	16.8 0.8	24.43 .06	58.3 2.6	34.53 +.03	57.8 0.4
28.4	63.47 .29	33.3 2.4	30.35 —.02	16.0 0.8	24.35 .11	60.8 2.4	34.54 .00	58.2 0.3
July 8.4	63.12 .29	35.5 2.0	30.32 .05	15.2 0.7	24.22 .15	63.1 2.1	34.52 —.04	58.5 0.3
18.4	62.69 —.46	37.3 +1.6	30.25 —.08	14.6 +0.6	24.05 —.19	65.0 +1.7	34.46 —.08	58.7 —0.2
28.3	62.21 .51	38.6 1.1	30.15 .11	14.0 0.5	23.84 .22	66.5 1.3	34.36 .11	58.9 —0.1
Aug. 7.3	61.68 .54	39.4 0.6	30.03 .13	13.5 0.4	23.60 .25	67.5 0.8	34.23 .14	59.0 0.0
17.3	61.12 .57	39.8 +0.1	29.88 .15	13.1 0.3	23.34 .27	68.2 +0.4	34.07 .17	59.0 +0.1
27.2	60.54 .58	39.6 —0.5	29.73 .16	12.9 0.2	23.06 .28	68.3 —0.1	33.90 .18	58.8 0.2
Sept. 6.2	59.95 —.58	38.9 —1.0	29.56 —.16	12.7 +0.1	22.77 —.29	68.0 —0.6	33.71 —.19	58.6 +0.3
16.2	59.38 .56	37.6 1.5	29.40 .16	12.7 —0.1	22.49 .28	67.1 1.0	33.53 .18	58.3 0.4
26.2	58.84 .52	35.9 2.0	29.24 .14	12.8 0.2	22.21 .26	65.9 1.5	33.36 .16	57.8 0.4
Oct. 6.1	58.35 .47	33.7 2.4	29.11 .12	13.1 0.4	21.97 .23	64.1 2.0	33.20 .14	57.4 0.5
16.1	57.91 .40	31.0 2.8	29.01 .08	13.6 0.5	21.75 .19	61.9 2.4	33.08 .10	56.9 0.5
26.1	57.56 —.31	28.0 —3.2	28.94 —.04	14.2 —0.7	21.58 —.14	59.3 —2.8	33.00 —.06	56.4 +0.5
Nov. 5.1	57.20 .22	24.6 3.5	28.92 .00	15.0 0.9	21.47 .08	56.4 3.1	32.96 —.01	56.0 0.4
15.0	57.12 —.11	21.0 3.7	28.94 +.05	16.1 1.1	21.42 —.02	53.2 3.3	32.98 +.05	55.6 0.3
25.0	57.07 .00	17.2 3.8	29.02 .10	17.3 1.3	21.43 +.04	49.7 3.5	33.05 .10	55.4 +0.1
Dec. 5.0	57.13 +.12	13.4 3.8	29.14 .15	18.7 1.5	21.50 .11	46.1 3.6	33.18 .16	55.4 0.0
14.9	57.31 +.23	9.5 —3.7	29.31 +.19	20.3 —1.6	21.64 +.17	42.5 —3.6	33.37 +.21	55.5 —0.2
24.9	57.59 .24	5.9 3.5	29.53 .23	22.0 1.7	21.85 .23	38.9 3.5	33.60 .25	55.8 0.4
34.9	57.98 +.44	2.5 —3.2	29.77 +.26	23.7 —1.7	22.10 +.28	35.5 —3.3	33.86 +.28	56.3 —0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\eta$ Draconis.		$\beta$ Herculis.		$\Lambda$ Draconis.		$\zeta$ Ophiuchi.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 16 22	+61° 45'	<sup>h</sup> <sup>m</sup> 16 25	+21° 43'	<sup>h</sup> <sup>m</sup> 16 28	+69° 0'	<sup>h</sup> <sup>m</sup> 16 30	-10° 20'
Jan. 0.9	<sup>s</sup> 25.72	+31	<sup>s</sup> 22.38	+23	<sup>s</sup> 8.84	+35	<sup>s</sup> 57.54	+34
10.9	26.07 .38	58.1 3.1	22.63 .98	62.9 2.5	9.25 .45	30.8 3.1	57.79 .97	15.2 1.3
20.9	26.48 .44	55.2 2.6	22.90 .98	60.5 2.3	9.75 .53	27.9 2.6	58.07 .99	16.5 1.3
30.8	26.95 .48	52.8 2.1	23.19 .30	58.4 1.9	10.32 .60	25.5 2.1	58.36 .30	17.8 1.9
Feb. 9.8	27.45 .51	51.0 1.5	23.50 .31	56.6 1.5	10.94 .64	23.7 1.5	58.67 .30	19.0 1.1
19.8	27.97 +.52	49.9 -0.8	23.81 +.31	55.3 -1.1	11.60 +.66	22.5 -0.8	58.97 +.30	20.1 -1.0
29.8	28.49 .52	49.4 -0.2	24.11 .30	54.5 0.6	12.27 .65	22.0 -0.1	59.27 .30	21.0 0.8
Mar. 10.7	29.00 .50	49.5 +0.5	24.41 .99	54.1 -0.1	12.92 .64	22.2 +0.5	59.57 .99	21.7 0.6
20.7	29.49 .46	50.4 1.1	24.69 .97	54.3 +0.4	13.55 .60	23.1 1.2	59.85 .97	22.3 0.4
30.7	29.93 .42	51.8 1.7	24.96 .95	54.9 0.8	14.12 .54	24.5 1.7	60.12 .96	22.6 -0.2
Apr. 9.6	30.32 +.36	53.8 +2.2	25.20 +.23	55.9 +1.2	14.63 +.47	26.5 +2.2	60.37 +.94	22.7 0.0
19.6	30.66 .30	56.3 2.6	25.41 .90	57.3 1.5	15.06 .98	29.0 2.6	60.59 .92	22.6 +0.1
29.6	30.91 .23	59.1 2.9	25.60 .17	59.0 1.8	15.40 .99	31.8 2.9	60.80 .19	22.4 0.3
May 9.6	31.12 .16	62.1 3.1	25.76 .14	60.9 2.0	15.64 .19	34.9 3.1	60.98 .16	22.1 0.4
19.5	31.24 .08	65.3 3.2	25.89 .11	63.0 2.1	15.78 +.09	38.1 3.2	61.13 .14	21.6 0.4
29.5	31.29 +.01	68.4 +3.1	25.98 +.07	65.1 +2.1	15.82 -.01	41.3 +3.2	61.25 +.10	21.2 +0.5
June 8.5	31.26 -.07	71.6 3.0	26.04 +.04	67.2 2.1	15.76 .11	44.4 3.1	61.34 .07	20.7 0.5
18.4	31.16 .14	74.5 2.8	26.06 .00	69.3 2.0	15.60 .91	47.4 2.9	61.39 +.04	20.2 0.5
28.4	30.99 .91	77.2 2.5	26.05 -.03	71.2 1.8	15.34 .30	50.2 2.6	61.41 .00	19.7 0.5
July 8.4	30.75 .97	79.6 2.2	26.00 .07	73.0 1.6	15.00 .38	52.6 2.2	61.39 -.03	19.2 0.4
18.4	30.45 -.32	81.6 +1.8	25.91 -.10	74.5 +1.4	14.56 -.45	54.6 +1.8	61.34 -.07	18.8 +0.4
28.3	30.11 .37	83.2 1.3	25.80 .13	75.8 1.1	14.10 .51	56.3 1.4	61.26 .10	18.4 0.3
Aug. 7.3	29.72 .41	84.3 0.9	25.65 .16	76.7 0.8	13.56 .56	57.4 0.9	61.14 .13	18.1 0.3
17.3	29.30 .43	84.9 +0.4	25.49 .18	77.4 0.5	12.97 .60	58.0 +0.4	61.00 .15	17.8 0.3
27.3	28.85 .45	85.0 -0.2	25.30 .19	77.7 +0.2	12.37 .62	58.1 -0.1	60.85 .16	17.6 0.2
Sept. 6.2	28.40 -.45	84.6 -0.7	25.11 -.19	77.7 -0.2	11.74 -.62	57.7 -0.7	60.68 -.17	17.4 +0.1
16.2	27.95 .44	83.7 1.2	24.92 .19	77.3 0.5	11.13 .61	56.8 1.2	60.51 .17	17.3 +0.1
26.2	27.52 .42	82.2 1.7	24.73 .18	76.6 0.9	10.53 .58	55.4 1.7	60.34 .15	17.3 0.0
Oct. 6.1	27.12 .38	80.3 2.2	24.57 .15	75.6 1.2	9.97 .53	53.5 2.2	60.20 .13	17.3 -0.1
16.1	26.77 .32	77.9 2.6	24.43 .12	74.2 1.6	9.47 .46	51.1 2.6	60.08 .16	17.5 0.2
26.1	26.47 -.26	75.1 -3.0	24.32 -.08	72.5 -1.9	9.05 -.38	48.3 -3.0	60.00 -.06	17.8 -0.4
Nov. 5.1	26.25 .18	71.9 3.3	24.26 -.04	70.4 2.2	8.71 .99	45.1 3.3	59.96 -.02	18.2 0.5
15.0	26.11 .10	68.5 3.6	24.25 +.01	68.1 2.4	8.47 .18	41.6 3.6	59.96 +.03	18.8 0.7
25.0	26.05 -.01	64.8 3.7	24.28 .06	65.6 2.6	8.35 -.06	37.9 3.8	60.02 .08	19.5 0.2
Dec. 5.0	26.09 +.08	61.0 3.8	24.37 .11	62.9 2.8	8.35 +.06	34.1 3.8	60.13 .13	20.4 1.0
14.9	26.22 +.17	57.2 -3.6	24.51 +.16	60.1 -2.8	8.46 +.17	30.3 -3.8	60.29 +.18	21.5 -1.2
24.9	26.44 .96	53.4 3.6	24.70 .90	57.3 2.8	8.69 .99	26.5 3.6	60.49 .92	22.7 1.3
34.9	26.74 +.34	49.9 -3.4	24.92 +.24	54.5 -2.7	9.04 +.40	23.0 -3.4	60.72 +.25	24.0 -1.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Trianguli Australis.		$\eta$ Herculis.		$\kappa$ Ophiuchi.		$\delta$ Herculis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 16 36	<sup>°</sup> <sup>'</sup> -68 48	<sup>h</sup> <sup>m</sup> 16 39	<sup>°</sup> <sup>'</sup> +39 7	<sup>h</sup> <sup>m</sup> 16 52	<sup>°</sup> <sup>'</sup> + 9 32	<sup>h</sup> <sup>m</sup> 16 57	<sup>°</sup> <sup>'</sup> +33 43
Jan. 0.9	<sup>s</sup> 44.36 +.53	<sup>"</sup> 56.3 +1.7	<sup>s</sup> 1.20 +.22	<sup>"</sup> 68.6 -3.3	<sup>s</sup> 20.06 +.21	<sup>"</sup> 64.0 -2.2	<sup>s</sup> 26.15 +.20	<sup>"</sup> 52.8 -3.1
10.9	44.94 .61	54.7 1.4	1.45 .26	65.5 3.0	20.28 .24	61.8 2.1	26.37 .24	49.8 2.9
20.9	45.59 .68	53.5 1.0	1.73 .30	62.6 2.7	20.53 .26	59.7 2.0	26.63 .27	47.0 2.6
30.8	46.29 .72	52.7 0.6	2.04 .32	60.2 2.2	20.80 .28	57.8 1.7	26.92 .30	44.5 2.3
Feb. 9.8	47.03 .75	52.4 +0.1	2.38 .34	58.2 1.7	21.09 .29	56.2 1.4	27.23 .31	42.5 1.8
19.8	47.80 +.76	52.5 -0.3	2.72 +.35	56.7 -1.1	21.38 +.29	54.9 -1.1	27.55 +.32	40.9 -1.3
29.8	48.56 .76	53.0 0.7	3.07 .34	55.9 -0.5	21.68 .29	54.0 0.7	27.87 .33	39.9 0.7
Mar. 10.7	49.31 .74	53.8 1.0	3.41 .33	55.7 +0.1	21.96 .28	53.5 -0.3	28.20 .32	39.5 -0.1
20.7	50.03 .70	55.0 1.4	3.74 .32	56.0 0.7	22.24 .27	53.3 +0.1	28.51 .31	39.6 +0.4
30.7	50.72 .66	56.6 1.7	4.05 .29	57.0 1.2	22.51 .26	53.6 0.4	28.82 .29	40.3 1.0
Apr. 9.6	51.35 +.61	58.4 -2.0	4.33 +.27	58.4 +1.7	22.76 +.24	54.2 +0.8	29.10 +.27	41.6 +1.4
19.6	51.93 .55	60.5 2.2	4.58 .23	60.3 2.1	23.00 .22	55.1 1.0	29.35 .24	43.2 1.9
29.6	52.44 .48	62.8 2.4	4.80 .20	62.6 2.4	23.21 .20	56.3 1.3	29.57 .21	45.3 2.2
May 9.6	52.88 .40	65.3 2.5	4.98 .16	65.1 2.6	23.39 .17	57.7 1.5	29.77 .18	47.6 2.4
19.5	53.24 .31	67.9 2.6	5.12 .12	67.8 2.8	23.55 .14	59.2 1.6	29.93 .14	50.2 2.6
29.5	53.51 +.22	70.6 -2.7	5.21 +.07	70.6 +2.8	23.67 +.11	60.8 +1.6	30.05 +.10	52.8 +2.7
June 8.5	53.64 .12	73.2 2.6	5.26 +.03	73.4 2.7	23.76 .08	62.5 1.6	30.13 .06	55.5 2.6
18.5	53.75 +.02	75.0 2.5	5.27 -0.1	76.1 2.6	23.82 +.04	64.1 1.6	30.16 +.02	58.1 2.5
28.4	53.72 -0.6	78.3 2.4	5.24 .06	78.6 2.4	23.85 .00	65.6 1.5	30.16 -0.3	60.6 2.4
July 8.4	53.59 .18	80.7 2.2	5.16 .10	80.9 2.1	23.83 -0.3	67.0 1.3	29.11 .07	62.9 2.2
18.4	53.36 -0.27	82.7 -1.9	5.04 -0.14	82.9 +1.8	23.78 -0.7	68.3 +1.2	30.02 -0.11	64.9 +1.9
28.3	53.05 .35	84.4 1.6	4.88 .17	84.6 1.5	23.70 .10	69.3 1.0	29.89 .14	66.6 1.6
Aug. 7.3	52.67 .42	85.8 1.2	4.69 .20	85.8 1.1	23.59 .13	70.2 0.8	29.73 .18	68.0 1.2
17.3	52.22 .47	86.8 0.7	4.47 .23	86.7 0.6	23.44 .15	70.9 0.5	29.54 .20	69.0 0.8
27.3	51.72 .51	87.3 -0.3	4.24 .24	87.1 +0.2	23.28 .17	71.3 0.3	29.33 .22	69.6 +0.4
Sept. 6.2	51.20 -0.52	87.3 +0.2	3.98 -0.25	87.1 -0.2	23.10 -0.18	71.5 +0.1	29.10 -0.23	69.8 0.0
16.2	50.68 .51	86.8 0.7	3.72 .25	86.7 0.7	22.93 .18	71.4 -0.2	28.86 .23	69.6 -0.4
26.2	50.18 .48	85.9 1.1	3.48 .23	85.7 1.2	22.75 .17	71.1 0.5	28.63 .22	69.0 0.9
Oct. 6.2	49.72 .42	84.6 1.5	3.25 .21	84.4 1.6	22.59 .15	70.5 0.7	28.42 .20	67.9 1.3
16.1	49.34 .34	82.8 1.9	3.06 .18	82.6 2.0	22.44 .13	69.7 1.0	28.22 .18	66.4 1.7
26.1	49.05 -0.24	80.7 +2.2	2.90 -0.14	80.4 -2.4	22.34 -0.09	68.5 -1.2	28.07 -0.14	64.5 -2.1
Nov. 5.1	48.87 -0.12	78.4 2.4	2.78 .09	77.8 2.7	22.26 -0.05	67.2 1.5	27.95 .09	62.2 2.4
15.0	48.80 .00	76.0 2.5	2.72 -0.03	74.9 3.0	22.24 .00	65.6 1.7	27.88 -0.04	59.6 2.7
25.0	48.87 +0.13	73.5 2.5	2.71 +0.02	71.7 3.2	22.26 +0.05	63.7 1.9	27.66 +0.01	56.7 3.0
Dec. 5.0	49.06 .25	71.0 2.4	2.77 .08	68.4 3.3	22.33 .09	61.7 2.1	27.90 .07	53.6 3.1
15.0	49.37 +0.37	68.7 +2.2	2.88 +0.14	65.0 -3.3	22.45 +0.14	59.5 -2.2	28.00 +0.12	50.4 -3.2
24.9	49.80 .48	66.7 1.9	3.05 .19	61.5 3.4	22.61 .18	57.3 2.2	28.15 .17	47.2 3.2
34.9	50.33 +0.58	64.9 +1.5	3.27 +0.24	58.2 -3.2	22.82 +0.22	55.1 -2.2	28.34 +0.22	44.0 -3.1



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\epsilon$ Ursæ Minoris.		$\alpha^1$ Herculis.		$\delta$ Ophiuchi.		$\beta$ Draconis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 16 57	+82° 12'	<sup>h</sup> <sup>m</sup> 17 9	+14° 30'	<sup>h</sup> <sup>m</sup> 17 19	-24° 4'	<sup>h</sup> <sup>m</sup> 17 27	+52° 22'
Jan. 0.9	<sup>s</sup> 19.93+ .55	71.8 -3.5	<sup>s</sup> 30.43 +.19	70.9 -2.4	<sup>s</sup> 29.54 +.21	8.2 -0.3	<sup>s</sup> 51.62 +.18	65.4 -3.6
10.9	20.64 .84	68.4 3.1	30.63 .22	68.6 2.3	29.77 .25	8.5 0.4	51.82 .23	61.9 3.4
20.9	21.61 1.10	65.5 2.7	30.87 .25	66.3 2.1	30.04 .28	8.9 0.5	52.09 .29	58.6 3.1
30.9	22.83 1.31	62.9 2.3	31.13 .27	64.3 1.9	30.33 .30	9.4 0.5	52.40 .33	55.7 2.7
Feb. 9.8	24.24 1.48	60.9 1.7	31.41 .29	62.6 1.6	30.63 .31	9.9 0.5	52.75 .37	53.2 2.2
19.8	25.79+1.59	59.5 -1.1	31.70 +.29	61.2 -1.2	30.95 +.22	10.5 -0.5	53.14 +.29	51.4 -1.6
29.8	27.42 1.64	58.7 -0.4	32.00 .29	60.2 0.8	31.28 .29	11.0 0.5	53.54 .41	50.1 0.9
Mar. 10.8	29.07 1.63	58.6 +0.2	32.29 .29	59.6 -0.3	31.60 .29	11.4 0.4	53.95 .41	49.5 -0.3
20.7	30.67 1.56	59.2 0.8	32.58 .28	59.5 +0.1	31.92 .31	11.9 0.4	54.36 .40	49.5 +0.3
30.7	32.18 1.43	60.3 1.4	32.85 .27	59.8 0.5	32.23 .30	12.2 0.3	54.75 .38	50.1 1.0
Apr. 9.7	33.54+1.26	62.0 +2.0	33.12 +.25	60.5 +0.9	32.52 +.29	12.5 -0.3	55.13 +.26	51.4 +1.5
19.6	34.70 1.05	64.2 2.4	33.36 .23	61.6 1.2	32.80 .27	12.7 0.2	55.47 .28	53.2 2.0
29.6	35.63 .81	66.6 2.7	33.58 .21	63.0 1.5	33.06 .25	12.9 0.2	55.78 .28	55.5 2.5
May 9.6	36.31 .54	69.7 3.0	33.78 .18	64.6 1.7	33.30 .23	13.1 0.2	56.04 .24	58.2 2.8
19.6	36.71+ .26	72.8 3.1	33.95 .16	66.4 1.8	33.52 .20	13.2 0.2	56.25 .18	61.1 3.0
29.5	36.84- .02	75.9 +3.1	34.09 +.12	68.3 +1.9	33.70 +.16	13.4 -0.2	56.41 +.13	64.2 +3.1
June 8.5	36.67 .30	79.1 3.1	34.20 .09	70.2 1.9	33.84 .12	13.6 0.2	56.51 .07	67.4 3.2
18.5	36.24 .57	82.1 2.9	34.27 .05	72.1 1.9	33.95 .09	13.8 0.2	56.55 +.01	70.6 3.1
28.4	35.54 .82	84.9 2.7	34.30 +.02	73.9 1.8	34.02 .05	14.0 0.2	56.53 -.05	73.6 3.0
July 8.4	34.60 1.05	87.5 2.4	34.30 -.02	75.7 1.7	34.05 +.01	14.2 0.2	56.45 .11	76.5 2.7
18.4	33.45-1.25	89.7 +2.0	34.25 -.06	77.2 +1.4	34.03 -.04	14.4 -0.2	56.31 -.16	79.1 +2.4
28.4	32.09 1.43	91.6 1.6	34.17 .10	78.5 1.2	33.98 .08	14.7 0.2	56.12 .21	81.4 2.1
Aug. 7.3	30.59 1.57	93.0 1.2	34.06 .13	79.5 1.0	33.88 .11	14.9 0.2	55.88 .26	83.2 1.7
17.3	28.96 1.68	93.9 0.7	33.92 .15	80.4 0.7	33.75 .14	15.0 0.1	55.60 .20	84.7 1.2
27.3	27.23 1.75	94.3 +0.2	33.75 .17	80.9 0.4	33.59 .17	15.1 -0.1	55.29 .23	85.7 0.8
Sept. 6.3	25.46-1.78	94.3 -0.3	33.57 -.18	81.2 +0.1	33.42 -.18	15.2 0.0	54.95 -.24	86.3 +0.3
16.2	23.67 1.77	93.7 0.8	33.38 .19	81.2 -0.2	33.23 .19	15.1 +0.1	54.60 .25	86.3 -0.2
26.2	21.92 1.72	92.6 1.3	33.20 .18	80.9 0.5	33.04 .18	15.0 0.1	54.24 .25	85.8 0.7
Oct. 6.2	20.24 1.62	91.1 1.8	33.02 .17	80.3 0.8	32.86 .17	14.9 0.2	53.90 .23	84.8 1.2
16.1	18.67 1.49	89.1 2.2	32.87 .14	79.3 1.1	32.71 .14	14.6 0.2	53.58 .20	83.4 1.7
26.1	17.26-1.31	86.6 -2.6	32.74 -.11	78.1 -1.4	32.59 -.10	14.4 +0.2	53.30 -.26	81.4 -2.2
Nov. 5.1	16.05 1.10	83.8 3.0	32.65 .07	76.6 1.6	32.50 .06	14.2 0.2	53.06 .21	79.0 2.6
15.1	15.07 .84	80.6 3.3	32.61 -.02	74.8 1.9	32.47 -.01	14.0 0.2	52.88 .15	76.2 3.0
25.0	14.36 .56	77.2 3.5	32.61 +.03	72.8 2.1	32.48 +.04	13.9 +0.1	52.76 .08	73.0 3.3
Dec. 5.0	13.94- .26	73.6 3.6	32.66 .07	70.6 2.3	32.55 .09	13.8 0.0	52.72 -.01	69.6 3.5
15.0	13.83+ .05	69.9 -3.7	32.76 +.12	68.2 -2.4	32.67 +.14	13.9 -0.1	52.74 +.06	65.9 -3.8
25.0	14.04 .26	66.3 3.6	32.90 .16	65.8 2.4	32.84 .19	14.1 0.2	52.83 .13	62.3 3.8
34.9	14.55+ .66	62.8 -3.4	33.09 +.21	63.3 -2.4	33.05 +.22	14.4 -0.3	53.00 +.22	58.7 -3.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Ophiuchi.		$\omega$ Draconis.		$\mu$ Herculis.		$\psi^1$ Draconis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 17 29	<sup>m</sup> +12° 38'	<sup>h</sup> 17 37	<sup>m</sup> +68° 48'	<sup>h</sup> 17 42	<sup>m</sup> +27° 47'	<sup>h</sup> 17 43	<sup>m</sup> +72° 11'
Jan. 1.0	42.09 +.17	36.1 -2.3	32.86 +.17	36.0 -3.7	2.44 +.15	14.9 -2.9	51.89 +.16	74.4 -3.7
10.9	42.28 .30	33.8 2.2	33.09 .36	32.4 3.5	2.61 .19	12.0 2.8	51.92 .30	70.7 3.5
20.9	42.50 .23	31.6 2.1	33.43 .39	29.0 3.2	2.82 .33	9.2 2.6	52.28 .42	67.3 3.2
30.9	42.75 .36	29.6 1.8	33.86 .47	26.0 2.8	3.07 .36	6.7 2.3	52.76 .53	64.3 2.8
Feb. 9.8	43.02 .27	27.9 1.6	34.38 .55	23.5 2.3	3.34 .38	4.6 1.9	53.34 .62	61.7 2.3
19.8	43.30 +.26	26.5 -1.2	34.95 +.60	21.5 -1.7	3.62 +.29	2.8 -1.5	53.99 +.68	59.6 -1.8
29.8	43.59 .29	25.5 0.8	35.57 .63	20.1 1.0	3.93 .30	1.6 1.0	54.71 .73	58.2 1.1
Mar. 10.8	43.88 .29	24.9 -0.4	36.22 .65	19.4 -0.4	4.23 .31	0.8 -0.5	55.45 .75	57.4 -0.5
20.7	44.17 .28	24.7 0.0	36.87 .64	19.4 +0.3	4.54 .30	0.6 +0.1	56.21 .74	57.3 +0.2
30.7	44.45 .28	25.0 +0.4	37.50 .61	20.0 0.9	4.84 .29	1.0 0.6	56.94 .72	57.8 0.9
Apr. 9.7	44.72 +.26	25.6 +0.8	38.09 +.57	21.3 +1.6	5.13 +.28	1.8 +1.1	57.64 +.67	59.0 +1.5
19.7	44.97 .24	26.6 1.1	38.63 .51	23.1 2.1	5.40 .26	3.1 1.5	58.28 .60	60.7 2.0
29.6	45.21 .22	27.9 1.4	39.10 .43	25.5 2.5	5.65 .24	4.8 1.9	59.84 .51	63.0 2.5
May 9.6	45.42 .20	29.4 1.6	39.50 .35	28.2 2.9	5.88 .21	6.9 2.2	59.30 .41	65.7 2.8
19.6	45.61 .17	31.2 1.8	39.80 .26	31.2 3.1	6.08 .18	9.2 2.4	59.66 .30	68.6 3.1
29.6	45.77 +.14	33.0 +1.9	40.01 +.16	34.4 +3.3	6.25 +.15	11.6 +2.5	59.90 +.18	71.8 +3.2
June 8.5	45.90 .11	34.9 1.9	40.12 +.06	37.7 3.3	6.38 .11	14.2 2.5	60.02 +.06	75.1 3.3
18.5	45.99 .07	36.7 1.8	40.12 -0.5	41.0 3.3	6.46 .07	16.7 2.5	60.03 -0.6	78.3 3.2
28.5	46.04 +.03	38.5 1.7	40.02 .15	44.2 3.1	6.51 +.03	19.2 2.4	59.90 .18	81.6 3.1
July 8.4	46.06 .00	40.2 1.6	39.82 .25	47.3 2.9	6.51 -0.2	21.5 2.2	59.66 .30	84.6 2.9
18.4	46.03 -0.4	41.7 +1.4	39.53 -0.34	50.0 +2.6	6.48 -0.6	23.6 +2.0	59.31 -0.40	87.4 +2.6
28.4	45.97 .06	43.1 1.2	39.15 .42	52.4 2.2	6.40 .10	25.5 1.7	58.86 .50	89.8 2.2
Aug. 7.4	45.87 .11	44.2 1.0	38.69 .49	54.5 1.8	6.28 .14	27.1 1.4	58.31 .59	91.9 1.9
17.3	45.74 .14	45.0 0.7	38.16 .55	56.1 1.4	6.12 .17	28.4 1.1	57.68 .66	93.6 1.4
27.3	45.58 .17	45.7 0.5	37.59 .60	57.3 0.9	5.94 .19	29.3 0.7	56.99 .71	94.8 1.0
Sept. 6.3	45.41 -0.18	46.0 +0.2	36.97 -0.63	57.9 +0.4	5.74 -0.21	29.9 +0.4	56.25 -0.75	95.6 +0.5
16.2	45.22 .19	46.1 -0.1	36.33 .64	58.1 -0.1	5.52 .22	30.1 0.0	55.48 .77	95.8 0.0
26.2	45.04 .18	45.9 0.3	35.69 .64	57.7 0.6	5.30 .22	29.8 -0.4	54.71 .77	95.5 -0.6
Oct. 6.2	44.85 .17	45.4 0.6	35.05 .62	56.8 1.2	5.08 .21	29.2 0.8	53.95 .75	94.6 1.1
16.2	44.69 .15	44.6 0.9	34.45 .57	55.4 1.7	4.88 .19	28.2 1.2	53.22 .70	93.3 1.6
26.1	44.56 -0.12	43.5 -1.2	33.90 -0.52	53.4 -2.2	4.71 -0.16	26.8 -1.6	52.54 -0.64	91.4 -2.1
Nov. 5.1	44.45 .06	42.2 1.5	33.42 .44	51.0 2.6	4.57 .12	25.0 2.0	51.94 .55	89.1 2.6
15.1	44.40 -0.04	40.6 1.7	33.02 .35	48.2 3.0	4.47 .07	22.8 2.3	51.44 .45	86.3 3.0
25.1	44.38 +0.1	38.7 2.0	32.72 .25	45.0 3.3	4.42 -0.03	20.4 2.6	51.04 .33	83.2 3.3
Dec. 5.0	44.41 .06	36.7 2.1	32.53 .14	41.5 3.6	4.42 +0.2	17.7 2.8	50.77 .20	79.8 3.5
15.0	44.49 +0.10	34.4 -2.3	32.45 -0.2	37.9 -3.7	4.47 +0.7	14.8 -2.9	50.64 -0.6	76.1 -3.7
25.0	44.62 .15	32.1 2.3	32.49 +0.10	34.1 3.7	4.57 .12	11.8 3.0	50.64 +0.7	72.4 3.7
35.0	44.79 +0.19	29.8 -2.3	32.65 +0.21	30.4 -3.6	4.72 +0.17	8.8 -2.9	50.78 +0.21	68.7 -3.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Draconis.		$\gamma^s$ Sagittarii.		$\mu$ Sagittarii.		$\eta$ Serpentis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 17 53	+51° 29'	<sup>h</sup> <sup>m</sup> 17 58	-30° 25'	<sup>h</sup> <sup>m</sup> 18 7	-21° 5'	<sup>h</sup> <sup>m</sup> 18 15	- 2° 55'
Jan. 1.0	<sup>s</sup> 57.82 +.13	70.7 -3.6	<sup>s</sup> 34.27 +.18	21.3 +0.3	<sup>s</sup> 1.57 +.18	8.1 -0.2	<sup>s</sup> 28.73 +.14	32.2 -1.4
11.0	57.99 .19	67.2 3.4	34.47 .23	21.2 0.2	1.76 .21	8.4 0.3	28.88 .17	33.5 1.3
20.9	58.21 .25	63.8 3.2	34.72 .26	20.9 0.1	1.98 .23	8.7 0.3	29.07 .20	34.9 1.3
30.9	58.48 .30	60.8 2.8	34.99 .29	20.8 +0.1	2.23 .26	9.0 0.3	29.29 .23	36.1 1.2
Feb. 9.9	58.80 .34	58.2 2.4	35.29 .31	20.8 0.0	2.50 .28	9.4 0.3	29.53 .25	37.2 1.0
19.8	59.16 +.37	56.0 -1.8	35.61 +.32	20.8 0.0	2.79 +.30	9.6 -0.2	29.79 +.27	38.2 -0.8
29.8	59.54 .39	54.5 1.2	35.94 .33	20.9 -0.1	3.09 .31	9.9 0.2	30.06 .28	38.9 0.6
Mar. 10.8	59.94 .40	53.6 -0.6	36.27 .34	20.9 0.1	3.40 .31	10.0 -0.1	30.35 .28	39.3 -0.3
20.8	60.34 .40	53.3 +0.1	36.61 .34	21.0 0.1	3.71 .31	10.1 0.0	30.63 .29	39.4 0.0
30.7	60.74 .39	53.7 0.7	36.95 .33	21.1 0.1	4.02 .31	10.0 +0.1	30.92 .29	39.3 +0.3
Apr. 9.7	61.12 +.37	54.8 +1.3	37.28 +.32	21.2 -0.1	4.33 +.30	9.9 +0.2	31.20 +.28	38.9 +0.5
19.7	61.48 .34	56.3 1.8	37.60 .31	21.3 0.1	4.63 .29	9.7 0.2	31.48 .27	38.3 0.7
29.6	61.81 .31	58.4 2.3	37.90 .29	21.5 0.2	4.91 .28	9.5 0.2	31.74 .26	37.5 0.9
May 9.6	62.09 .28	60.9 2.7	38.18 .27	21.7 0.2	5.18 .26	9.2 0.3	31.99 .24	36.5 1.0
19.6	62.34 .29	63.8 2.9	38.44 .24	22.0 0.3	5.43 .23	9.0 0.2	32.22 .22	35.4 1.1
29.6	62.53 +.17	66.8 +3.1	38.67 +.21	22.3 -0.4	5.65 +.21	8.7 +0.2	32.43 +.19	34.2 +1.2
June 8.5	62.67 .11	70.0 3.2	38.87 .18	22.7 0.4	5.84 .17	8.5 0.2	32.60 .16	33.0 1.2
18.5	62.74 +.05	73.2 3.2	39.02 .14	23.1 0.5	5.99 .13	8.4 +0.1	32.75 .13	31.8 1.1
28.5	62.76 -0.1	76.4 3.1	39.14 .09	23.6 0.5	6.11 .09	8.4 0.0	32.85 .09	30.7 1.1
July 8.4	62.72 .07	79.4 2.9	39.20 +.04	24.2 0.6	6.18 +.05	8.4 0.0	32.92 .05	29.7 1.0
18.4	62.62 -0.13	82.2 +2.6	39.23 .00	24.8 -0.6	6.20 .00	8.4 -0.1	32.95 +.01	28.7 +0.9
28.4	62.47 .18	84.7 2.3	39.20 -0.05	25.4 0.6	6.19 -0.04	8.5 0.1	32.93 -0.04	27.9 0.7
Aug. 7.4	62.26 .23	86.8 2.0	39.13 .09	25.9 0.5	6.13 .08	8.7 0.2	32.87 .08	27.3 0.6
17.3	62.00 .27	88.6 1.6	39.01 .13	26.4 0.5	6.03 .12	8.9 0.2	32.78 .11	26.8 0.4
27.3	61.71 .31	89.9 1.1	38.86 .16	26.9 0.4	5.90 .15	9.1 0.2	32.65 .14	26.4 0.3
Sept. 6.3	61.39 -0.33	90.8 +0.6	38.69 -0.19	27.2 -0.3	5.74 -0.17	9.2 -0.2	32.50 -0.16	26.2 +0.1
16.3	61.04 .35	91.2 +0.1	38.49 .20	27.4 -0.1	5.56 .18	9.4 0.1	32.33 .17	26.1 0.0
26.2	60.69 .34	91.1 -0.4	38.29 .20	27.5 0.0	5.37 .17	9.5 -0.1	32.15 .18	26.2 -0.2
Oct. 6.2	60.35 .33	90.4 0.9	38.09 .19	27.5 +0.1	5.19 .18	9.6 0.0	31.98 .17	26.4 0.3
16.2	60.02 .31	89.3 1.4	37.91 .17	27.3 0.2	5.02 .16	9.6 0.0	31.81 .16	26.8 0.4
26.2	59.73 -0.28	87.6 -1.9	37.75 -0.14	27.0 +0.3	4.87 -0.13	9.6 0.0	31.66 -0.13	27.3 -0.6
Nov. 5.1	59.47 .23	85.5 2.3	37.63 .10	26.6 0.4	4.75 .09	9.6 0.0	31.54 .10	28.0 0.7
15.1	59.26 .18	83.0 2.7	37.56 -0.05	26.2 0.4	4.68 -0.05	9.6 0.0	31.46 .08	28.8 0.9
25.1	59.12 .11	80.1 3.1	37.53 .00	25.7 0.5	4.65 .00	9.6 0.0	31.42 -0.02	29.8 1.0
Dec. 5.0	59.03 -0.05	76.8 3.4	37.56 +0.06	25.3 0.4	4.67 +0.04	9.7 -0.1	31.42 +0.03	30.9 1.2
15.0	59.02 +0.02	73.3 -3.5	37.65 +0.11	24.9 +0.4	4.74 +0.09	9.8 -0.2	31.47 +0.07	32.1 -1.3
25.0	59.07 .09	69.7 3.6	37.78 .16	24.5 0.3	4.86 .14	10.1 0.2	31.57 .11	33.4 1.3
35.0	59.19 +0.15	66.1 -3.5	37.97 +0.21	24.2 +0.3	5.02 +0.18	10.3 -0.3	31.70 +0.15	34.8 -1.4

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	1 Aquilæ.		σ Octantis.		α Lyre. (Vega.)		β Lyre.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 18 <sup>m</sup> 29	<sup>°</sup> — 8 <sup>'</sup> 19	<sup>h</sup> 18	<sup>°</sup> — 89 <sup>'</sup> 15	<sup>h</sup> 18 <sup>m</sup> 33	<sup>°</sup> + 38 <sup>'</sup> 40	<sup>h</sup> 18 <sup>m</sup> 45	<sup>°</sup> + 33 <sup>'</sup> 13
Jan. 1.0	<sup>s</sup> 4.54 +.13	<sup>"</sup> 13.7 —1.0	<sup>m</sup> <sup>s</sup> <sup>s</sup> 36 32.0+ 4.5	<sup>"</sup> 62.5 +3.3	<sup>s</sup> 6.61 +.08	<sup>"</sup> 51.3 —3.2	<sup>s</sup> 54.58 +.08	<sup>"</sup> 63.1 —3.0
11.0	4.69 .16	14.7 1.0	36 38.1 7.6	59.2 3.2	6.72 .13	48.1 3.2	54.68 .12	60.1 3.0
20.9	4.87 .90	15.7 1.0	36 47.2 10.5	56.2 2.9	6.88 .18	45.0 3.0	54.93 .16	57.2 2.9
30.9	5.08 .23	16.6 0.9	36 59.1 13.0	53.3 2.7	7.08 .22	42.0 2.8	55.01 .20	54.4 2.6
Feb. 9.9	5.32 .25	17.4 0.7	37 13.3 15.2	50.8 2.3	7.32 .26	39.4 2.4	55.23 .24	51.9 2.3
19.9	5.58 +.26	18.1 —0.6	37 29.6+17.0	48.7 +1.9	7.59 +.29	37.3 —1.9	55.48 +.26	49.8 —1.9
29.8	5.85 .28	18.6 0.4	37 47.4 18.4	47.0 1.5	7.89 .31	35.6 1.4	55.76 .29	48.1 1.4
Mar. 10.8	6.13 .29	18.8 —0.2	38 6.3 19.3	45.8 1.0	8.21 .32	34.4 0.6	56.06 .30	47.0 0.9
20.8	6.42 .29	18.9 +0.1	38 26.0 19.8	45.0 +0.5	8.54 .33	33.9 —0.3	56.37 .31	46.4 —0.3
30.8	6.72 .29	18.7 0.3	38 45.9 19.9	44.7 0.0	8.87 .33	33.9 +0.4	56.68 .32	46.3 +0.2
Apr. 9.7	7.01 +.29	18.3 +0.5	39 5.7+19.5	44.9 —0.4	9.21 +.33	34.6 +0.9	57.00 +.31	46.9 +0.8
19.7	7.29 .28	17.8 0.7	39 25.0 18.8	45.6 0.9	9.53 .32	35.7 1.4	57.31 .30	47.9 1.3
29.7	7.57 .27	17.1 0.8	39 43.3 17.6	46.8 1.4	9.84 .30	37.4 1.9	57.61 .29	49.5 1.8
May 9.6	7.83 .25	16.2 0.9	40 0.3 16.2	48.4 1.8	10.12 .27	39.5 2.3	57.89 .27	51.5 2.1
19.6	8.08 .23	15.3 1.0	40 15.6 14.3	50.4 2.2	10.38 .24	42.0 2.6	58.15 .24	53.8 2.4
29.6	8.30 +.21	14.3 +1.0	40 28.9+12.2	52.7 —2.5	10.60 +.20	44.7 +2.8	58.38 +.21	56.3 +2.7
June 8.6	8.49 .18	13.3 0.9	40 39.9 9.7	55.4 2.8	10.78 .16	47.6 3.0	58.57 .17	59.1 2.8
18.5	8.65 .14	12.4 0.9	40 48.4 7.1	58.3 3.0	10.92 .11	50.7 3.0	58.72 .13	61.9 2.8
28.5	8.78 .10	11.5 0.8	40 54.1 4.2	61.3 3.1	11.01 .07	53.6 3.0	58.83 .09	64.8 2.8
July 8.5	8.86 .06	10.7 0.7	40 56.8+ 1.2	64.4 3.1	11.05 +.02	56.6 2.8	58.89 +.04	67.6 2.7
18.5	8.90 +.02	10.1 +0.6	40 56.5— 1.8	67.6 —3.1	11.04 —.03	59.3 +2.7	58.91 —.01	70.2 +2.6
28.4	8.90 —.02	9.5 0.5	40 53.2 4.8	70.6 2.9	10.98 .06	61.9 2.4	58.87 .06	72.7 2.4
Aug. 7.4	8.86 .06	9.1 0.4	40 47.0 7.6	73.4 2.7	10.87 .13	64.2 2.1	58.79 .11	74.9 2.1
17.4	8.78 .10	8.7 0.3	40 38.0 10.2	76.0 2.4	10.71 .17	66.2 1.8	58.67 .15	76.8 1.7
27.3	8.66 .13	8.5 +0.1	40 26.6 12.4	78.2 2.0	10.52 .21	67.8 1.4	58.50 .18	78.4 1.4
Sept. 6.3	8.52 —.15	8.4 0.0	40 13.2—14.2	79.9 —1.5	10.30 —.23	69.0 +1.0	58.31 —.21	79.6 +1.0
16.3	8.35 .17	8.5 —0.1	39 58.1 15.5	81.1 0.9	10.05 .25	69.7 0.5	58.09 .23	80.4 0.6
26.3	8.18 .18	8.5 0.1	39 42.1 16.2	81.8 —0.4	9.80 .26	70.1 +0.1	57.86 .24	80.9 +0.2
Oct. 6.2	8.00 .17	8.7 0.2	39 25.7 16.3	81.8 +0.2	9.53 .26	69.9 —0.4	57.62 .24	80.8 —0.2
16.2	7.83 .16	9.0 0.3	39 9.6 15.7	81.3 0.8	9.28 .25	69.3 0.8	57.38 .23	80.4 0.7
26.2	7.66 —.14	9.4 —0.4	38 54.4—14.4	80.1 +1.4	9.04 —.22	68.2 —1.3	57.16 —.21	79.4 —1.1
Nov. 5.2	7.56 .11	9.9 0.5	38 40.7 12.6	78.4 2.0	8.83 .19	66.7 1.7	56.97 .18	78.1 1.5
15.1	7.47 .07	10.4 0.6	38 29.1 10.2	76.2 2.4	8.66 .15	64.8 2.1	56.81 .14	76.3 1.9
25.1	7.42 —.03	11.1 0.7	38 20.2 7.4	73.6 2.8	8.53 .10	62.4 2.5	56.69 .10	74.2 2.3
Dec. 5.1	7.42 +.02	11.9 0.8	38 14.3 4.3	70.7 3.1	8.46 —.05	59.7 2.8	56.61 —.05	71.8 2.6
15.0	7.46 +.06	12.8 —0.2	38 11.7— 1.0	67.5 +3.2	8.43 .00	56.8 —3.0	56.58 .00	69.0 —2.8
25.0	7.54 .11	13.7 1.0	38 12.4+ 2.4	64.2 3.3	8.45 +.05	53.6 3.2	56.61 +.05	66.1 2.9
35.0	7.67 +.15	14.7 —1.0	38 16.4+ 5.7	60.9 +3.2	8.54 +.11	50.4 —3.2	56.68 +.09	63.1 —3.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\sigma$ Sagittarii.		50 Draconis.		$\zeta$ Aquilæ.		$\delta$ Sagittarii.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 18 48	—26° 25'	<sup>h</sup> <sup>m</sup> 18 49	+75° 17'	<sup>h</sup> <sup>m</sup> 19 0	+13° 41'	<sup>h</sup> <sup>m</sup> 19 11	—19° 8'
Jan. 1.0	16.73 +.13	62.2 +0.2	54.36 —.06	71.1 —3.5	13.69 +.06	55.1 —2.1	2.55 +.10	62.8 —0.2
11.0	16.88 .17	62.0 0.2	54.36 +.06	67.5 3.6	13.79 .19	53.0 2.1	2.66 .13	62.9 0.2
20.9	17.07 .90	61.8 0.2	54.52 .25	64.0 3.5	13.93 .15	50.9 2.0	2.82 .17	63.1 0.1
30.9	17.29 .23	61.6 0.2	54.85 .40	60.6 3.3	14.10 .18	48.9 1.8	3.00 .20	63.2 —0.1
Feb. 9.9	17.54 .26	61.4 0.2	55.32 .54	57.5 2.9	14.30 .21	47.2 1.5	3.22 .23	63.3 0.0
19.9	17.91 +.28	61.2 +0.2	55.93 +.06	54.8 —2.4	14.53 +.24	45.7 —1.3	3.46 +.25	63.2 +0.1
29.9	18.10 .30	61.0 0.2	56.64 .76	52.6 1.9	14.77 .26	44.5 1.0	3.72 .27	63.1 0.2
Mar. 10.8	18.41 .31	60.7 0.2	57.45 .83	51.0 1.3	15.04 .27	43.7 0.6	4.00 .29	62.9 0.2
20.8	18.73 .32	60.4 0.2	58.30 .87	50.0 —0.6	15.31 .28	43.4 —0.1	4.30 .30	62.5 0.4
30.8	19.05 .32	60.0 0.4	59.18 .86	49.7 0.0	15.60 .29	43.5 +0.3	4.60 .31	62.1 0.5
Apr. 9.7	19.38 +.32	59.6 +0.4	60.06 +.86	50.0 +0.7	15.89 +.29	43.9 +0.7	4.91 +.31	61.5 +0.6
19.7	19.70 .32	59.3 0.4	60.91 .82	51.0 1.3	16.17 .28	44.8 1.1	5.22 .31	60.9 0.7
29.7	20.02 .31	58.9 0.4	61.70 .75	52.6 1.8	16.46 .28	46.1 1.4	5.52 .30	60.2 0.7
May 9.7	20.32 .30	58.5 0.2	62.41 .65	54.7 2.2	16.73 .26	47.6 1.7	5.82 .29	59.5 0.7
19.6	20.61 .27	58.3 0.2	63.01 .54	57.2 2.7	16.98 .24	49.4 1.9	6.11 .27	58.7 0.7
29.6	20.87 +.25	58.1 +0.1	63.49 +.42	60.0 +3.0	17.21 +.22	51.4 +2.0	6.37 +.25	58.1 +0.6
June 8.6	21.11 .22	58.0 0.0	63.84 .28	63.2 3.2	17.42 .19	53.5 2.1	6.61 .23	57.5 0.5
18.6	21.31 .18	58.0 —0.1	64.05 +.14	66.5 3.2	17.59 .15	55.6 2.1	6.82 .19	57.0 0.5
28.5	21.47 .14	58.1 0.2	64.11 —0.1	69.9 3.4	17.73 .12	57.7 2.1	7.00 .15	56.6 0.3
July 8.5	21.58 .09	58.3 0.2	64.03 .16	73.2 3.2	17.82 .07	59.7 2.0	7.13 .11	56.3 0.2
18.5	21.65 +.05	58.6 —0.4	63.79 —.30	76.5 +3.2	17.87 +.02	61.6 +1.8	7.22 +.06	56.1 +0.1
28.4	21.67 .00	59.1 0.4	63.42 .44	79.5 2.9	17.88 —.01	63.4 1.7	7.26 +.02	56.1 0.0
Aug. 7.4	21.65 —.05	59.5 0.5	62.91 .56	82.3 2.7	17.84 .06	65.0 1.4	7.25 —.02	56.2 —0.1
17.4	21.58 .09	60.0 0.5	62.29 .68	84.8 2.3	17.77 .09	66.3 1.0	7.20 .07	56.3 0.2
27.4	21.46 .13	60.5 0.5	61.56 .78	87.0 1.9	17.66 .12	67.4 0.9	7.11 .11	56.6 0.2
Sept. 6.3	21.32 —.16	61.0 —0.4	60.74 —.85	88.7 +1.5	17.51 —.15	68.2 +0.7	6.99 —.14	56.9 —0.2
16.3	21.15 .18	61.4 0.4	59.86 .91	90.0 1.0	17.35 .17	68.7 0.4	6.83 .16	57.2 0.2
26.3	20.96 .19	61.7 0.2	58.93 .94	90.7 +0.5	17.16 .18	69.0 +0.1	6.66 .18	57.5 0.2
Oct. 6.2	20.76 .19	61.9 0.2	57.98 .95	91.0 0.0	16.98 .19	68.9 —0.2	6.48 .18	57.8 0.2
16.2	20.58 .18	62.1 —0.1	57.03 .92	90.7 —0.6	16.79 .18	68.6 0.5	6.30 .17	58.1 0.2
26.2	20.41 —.16	62.1 0.0	56.11 —.89	89.8 —1.1	16.62 —.16	67.9 —0.8	6.14 —.16	58.3 —0.2
Nov. 5.2	20.26 .13	62.1 +0.1	55.24 .83	88.5 1.6	16.46 .14	67.0 1.1	5.99 .13	58.6 0.2
15.1	20.16 .09	61.9 0.2	54.45 .74	86.6 2.1	16.34 .11	65.8 1.2	5.87 .10	58.8 0.2
25.1	20.09 —.04	61.8 0.2	53.76 .63	84.2 2.6	16.25 .07	64.3 1.6	5.80 .06	58.9 0.2
Dec. 5.1	20.07 +.01	61.6 0.2	53.20 .50	81.4 3.0	16.20 —.02	62.6 1.8	5.76 —.01	59.1 0.2
15.1	20.10 +.06	61.3 +0.2	52.77 —.35	78.3 —3.2	16.20 +.02	60.7 —2.0	5.77 +.02	59.3 —0.2
25.0	20.18 .10	61.1 0.2	52.50 .19	74.9 3.5	16.23 .06	58.6 2.1	5.82 .07	59.5 0.2
35.0	20.30 +.15	60.9 +0.2	52.39 —.02	71.3 —3.6	16.31 +.10	56.5 —2.1	5.91 +.11	59.7 —0.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Draconis.			$\tau$ Draconis.			$\delta$ Aquilæ.			$\kappa$ Aquilæ.		
	Right Ascension.	Declination North.		Right Ascension.	Declination North.		Right Ascension.	Declination North.		Right Ascension.	Declination South.	
	<sup>h</sup> 19	<sup>m</sup> 12	<sup>°</sup> +67	<sup>h</sup> 19	<sup>m</sup> 17	<sup>°</sup> +73	<sup>h</sup> 19	<sup>m</sup> 19	<sup>°</sup> + 2	<sup>h</sup> 19	<sup>m</sup> 30	<sup>°</sup> - 7
Jan. 1.0	<sup>s</sup> 28.49	-.07	59.1 -3.5	<sup>s</sup> 38.38	-.15	57.6 -3.5	<sup>s</sup> 49.00	+0.8	34.6 -1.5	<sup>s</sup> 49.78	+0.7	30.7 -0.9
11.0	28.48	+.04	55.5 3.6	38.30	-.01	54.1 3.6	49.09	.11	33.1 1.5	49.86	.10	31.5 0.8
21.0	28.57	.14	51.9 3.5	38.37	+.14	50.5 3.5	49.22	.14	31.6 1.4	49.99	.14	32.3 0.8
30.9	28.76	.94	48.5 3.3	38.58	.28	47.1 3.4	49.38	.16	30.3 1.3	50.14	.17	33.1 0.7
Feb. 9.9	29.06	.34	45.3 3.0	38.92	.40	43.8 3.1	49.55	.19	29.1 1.1	50.33	.90	33.7 0.6
19.9	29.14	+.42	42.4 -2.6	39.38	+.52	40.9 -2.7	49.77	+.23	28.1 -0.9	50.54	+.22	34.2 -0.4
29.9	29.90	.49	40.0 2.1	39.96	.62	38.4 2.2	50.01	.25	27.3 0.6	50.77	.24	34.5 -0.9
Mar. 10.8	30.42	.54	38.2 1.5	40.61	.69	36.5 1.6	50.26	.26	26.9 -0.3	51.02	.26	34.6 0.0
20.8	30.98	.58	37.0 0.9	41.34	.74	35.2 1.0	50.53	.27	26.7 0.0	51.29	.27	34.4 +0.3
30.8	31.59	.61	36.4 -0.2	42.10	.77	34.5 -0.3	50.81	.28	26.9 +0.3	51.57	.28	34.0 0.5
Apr. 9.8	32.19	+.60	36.5 +0.4	42.88	+.77	34.5 +0.3	51.09	+.28	27.4 +0.7	51.86	+.29	33.4 +0.7
19.7	32.79	.58	37.3 1.1	43.65	.75	35.2 0.9	51.38	.29	28.3 1.0	52.16	.29	32.6 0.9
29.7	33.36	.55	38.7 1.6	44.38	.70	36.4 1.5	51.67	.28	29.4 1.2	52.45	.29	31.6 1.1
May 9.7	33.89	.50	40.6 2.1	45.06	.64	38.3 2.1	51.95	.27	30.7 1.4	52.74	.28	30.5 1.2
19.6	34.36	.44	42.9 2.6	45.66	.55	40.6 2.5	52.22	.25	32.2 1.5	53.02	.27	29.3 1.2
29.6	34.76	+.36	45.7 +2.9	46.16	+.45	43.3 +2.9	52.46	+.23	33.8 +1.6	53.28	+.25	28.1 +1.3
June 8.6	35.08	.27	48.8 3.2	46.56	.34	46.3 3.1	52.69	.21	35.5 1.7	53.52	.23	26.8 1.2
18.6	35.31	.18	52.1 3.4	46.84	.22	49.6 3.3	52.88	.18	37.1 1.7	53.74	.19	25.6 1.2
28.5	35.44	+.08	55.5 3.4	47.00	+.09	53.0 3.4	53.04	.15	38.8 1.6	53.91	.16	24.4 1.1
July 8.5	35.46	-.01	59.0 3.4	47.02	-.04	56.4 3.4	53.17	.11	40.3 1.5	54.05	.12	23.4 1.0
18.5	35.41	-.11	62.4 +3.3	46.91	-.17	59.8 +3.3	53.24	+.05	41.8 +1.4	54.15	+.07	22.5 +0.8
28.5	35.25	.21	65.6 3.1	46.68	.29	63.0 3.2	53.27	+.01	43.1 1.2	54.20	+.03	21.8 0.7
Aug. 7.4	35.00	.30	68.6 2.9	46.32	.41	66.1 2.9	53.27	-.04	44.2 1.0	54.21	-.01	21.2 0.5
17.4	34.65	.38	71.4 2.6	45.85	.52	68.9 2.6	53.22	.07	45.1 0.8	54.18	.06	20.7 0.4
27.4	34.24	.45	73.8 2.2	45.29	.61	71.4 2.3	53.13	.11	45.8 0.6	54.10	.09	20.4 0.2
Sept. 6.3	33.75	-.51	75.8 +1.8	44.63	-.69	73.5 +1.9	53.01	-.13	46.4 +0.4	53.99	-.12	20.3 +0.1
16.3	33.21	.56	77.3 1.3	43.91	.75	75.1 1.4	52.86	.16	46.7 +0.2	53.85	.15	20.3 0.0
26.3	32.63	.59	78.4 0.8	43.13	.79	76.3 0.9	52.69	.17	46.8 0.0	53.69	.16	20.3 -0.1
Oct. 6.3	32.03	.60	79.0 +0.3	42.32	.82	77.0 +0.4	52.51	.18	46.7 -0.2	53.52	.17	20.5 0.3
16.2	31.43	.60	79.0 -0.2	41.50	.82	77.2 -0.1	52.34	.17	46.5 0.4	53.35	.17	20.9 0.4
26.2	30.84	-.58	78.4 -0.8	40.69	-.79	76.7 -0.7	52.18	-.16	46.0 -0.6	53.19	-.16	21.3 -0.4
Nov. 5.2	30.27	.54	77.3 1.4	39.91	.75	75.8 1.2	52.03	.14	45.3 0.8	53.04	.13	21.8 0.5
15.2	29.76	.48	75.7 1.9	39.19	.68	74.3 1.8	51.91	.11	44.5 0.9	52.92	.11	22.3 0.6
25.1	29.30	.41	73.6 2.4	38.55	.60	72.3 2.3	51.82	.07	43.4 1.1	52.83	.07	23.0 0.7
Dec. 5.1	28.93	.33	71.0 2.8	38.00	.49	69.8 2.7	51.77	-.03	42.2 1.3	52.77	-.03	23.7 0.8
15.1	28.64	-.24	68.0 -3.1	37.56	-.37	66.9 -3.1	51.75	+.01	40.9 -1.4	52.76	+.01	24.5 -0.8
25.0	28.45	.14	64.7 3.4	37.25	.24	63.6 3.4	51.79	.05	39.5 1.4	52.79	.05	25.4 0.9
35.0	28.37	-.04	61.2 -3.6	37.08	-.10	60.2 -3.5	51.86	+.09	38.0 -1.5	52.85	+.08	26.2 -0.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Aquilæ.		$\alpha$ Aquilæ. (Altair.)		$\epsilon$ Draconis.		$\beta$ Aquilæ.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 19 40 <sup>m</sup>	<sup>°</sup> +10 20 <sup>'</sup>	<sup>h</sup> 19 45 <sup>m</sup>	<sup>°</sup> + 8 34 <sup>'</sup>	<sup>h</sup> 19 48 <sup>m</sup>	<sup>°</sup> +69 58 <sup>'</sup>	<sup>h</sup> 19 49 <sup>m</sup>	<sup>°</sup> + 6 7 <sup>'</sup>
Jan. 1.0	54.09+.04	30.3 -1.8	17.12+.04	25.9 -1.7	29.61-.19	66.4 -3.3	46.69+.04	41.6 -1.5
11.0	54.15 .08	28.5 1.8	17.18 .08	24.2 1.7	29.48 -.07	63.0 3.5	46.74 .08	40.0 1.6
21.0	54.25 .12	26.7 1.8	17.28 .11	22.5 1.7	29.47 +.05	59.4 3.5	46.84 .11	38.5 1.5
31.0	54.39 .15	24.9 1.6	17.41 .15	20.9 1.6	29.57 .16	55.9 3.4	46.97 .14	37.0 1.4
Feb. 9.9	54.55 .18	23.4 1.4	17.57 .18	19.4 1.3	29.80 .28	52.6 3.2	47.12 .17	35.6 1.2
19.9	54.74 +.20	22.0 -1.2	17.76 +.20	18.2 -1.1	30.13 +.38	49.5 -2.9	47.31 +.20	34.5 -1.0
29.9	54.96 .23	21.0 0.9	17.98 .23	17.2 0.8	30.56 .47	46.8 2.4	47.52 .22	33.6 0.7
Mar. 10.9	55.20 .25	20.3 0.5	18.21 .25	16.6 0.5	31.07 .55	44.6 1.9	47.76 .24	33.1 -0.4
20.8	55.46 .27	20.0 -0.1	18.47 .26	16.3 -0.1	31.66 .61	42.9 1.3	48.01 .26	32.9 0.0
30.8	55.73 .28	20.0 +0.3	18.74 .28	16.4 +0.3	32.29 .65	41.9 0.7	48.29 .27	33.0 +0.3
Apr. 9.8	56.01 +.29	20.5 +0.6	19.02 +.29	16.9 +0.7	32.95 +.66	41.5 -0.1	48.56 +.28	33.5 +0.6
19.8	56.30 .29	21.3 1.0	19.31 .29	17.7 1.0	33.62 .66	41.8 +0.6	48.85 .29	34.3 1.0
29.7	56.59 .29	22.4 1.3	19.60 .29	18.9 1.3	34.27 .64	42.7 1.2	49.14 .29	35.4 1.3
May 9.7	56.88 .28	23.9 1.6	19.89 .28	20.4 1.6	34.90 .60	44.2 1.8	49.42 .28	36.8 1.5
19.7	57.16 .27	25.6 1.8	20.17 .27	22.0 1.8	35.47 .54	46.3 2.3	49.70 .27	38.4 1.7
29.6	57.42 +.26	27.5 +1.9	20.44 +.26	23.9 +1.9	35.98 +.47	48.8 +2.7	49.97 +.26	40.1 +1.8
June 8.6	57.65 .22	29.5 2.0	20.68 .23	25.8 2.0	36.40 .39	51.6 3.0	50.21 .23	42.0 1.9
18.6	57.86 .19	31.5 2.1	20.89 .20	27.8 2.0	36.73 .28	54.8 3.3	50.43 .20	43.8 1.9
28.6	58.03 .15	33.6 2.0	21.07 .16	29.8 1.9	36.96 .18	58.2 3.4	50.61 .16	45.7 1.8
July 8.5	58.17 .11	35.5 1.9	21.21 .12	31.7 1.9	37.09 +.07	61.6 3.5	50.76 .12	47.5 1.7
18.5	58.26 +.07	37.4 +1.8	21.31 +.08	33.5 +1.7	37.10 -.04	65.1 +3.5	50.86 +.08	49.2 +1.6
28.5	58.31 +.03	39.2 1.6	21.36 +.03	35.2 1.6	37.00 .15	68.5 3.4	50.92 +.04	50.7 1.4
Aug. 7.4	58.31 -.02	40.7 1.4	21.37 -.01	36.7 1.4	36.79 .26	71.8 3.2	50.94 -.01	52.0 1.3
17.4	58.28 .06	42.1 1.2	21.34 .05	37.9 1.2	36.49 .35	74.9 2.9	50.91 .05	53.2 1.1
27.4	58.20 .10	43.2 1.0	21.27 .09	39.0 1.0	36.08 .44	77.7 2.6	50.84 .09	54.1 0.8
Sept. 6.4	58.08 -.13	44.1 +0.7	21.16 -.12	39.8 +0.7	35.60 -.52	80.2 +2.3	50.74 -.12	54.9 +0.6
16.3	57.94 .15	44.7 0.5	21.02 .15	40.4 0.5	35.04 .58	82.2 1.8	50.61 .14	55.4 0.4
26.3	57.78 .17	45.0 +0.2	20.86 .17	40.8 +0.2	34.43 .63	83.8 1.4	50.45 .16	55.6 +0.1
Oct. 6.3	57.60 .18	45.1 0.0	20.69 .17	40.8 0.0	33.78 .66	85.0 0.9	50.28 .17	55.6 -0.1
16.3	57.42 .18	45.0 -0.3	20.52 .17	40.7 -0.3	33.12 .67	85.6 +0.3	50.11 .17	55.4 0.3
26.2	57.25 -.17	44.5 -0.6	20.35 -.16	40.3 -0.5	32.44 -.67	85.6 -0.2	49.94 -.16	55.0 -0.5
Nov. 5.2	57.09 .15	43.8 0.8	20.19 .15	39.6 0.8	31.78 .64	85.1 0.8	49.79 .14	54.4 0.7
15.2	56.95 .12	42.9 1.1	20.06 .12	38.8 1.0	31.16 .60	84.0 1.3	49.65 .12	53.6 0.9
25.2	56.85 .09	41.7 1.3	19.95 .09	37.7 1.2	30.59 .53	82.4 1.9	49.54 .09	52.5 1.1
Dec. 5.1	56.77 .06	40.3 1.5	19.88 .05	36.4 1.4	30.09 .46	80.3 2.4	49.47 .06	51.3 1.3
15.1	56.74 -.02	38.8 -1.7	19.84 -.02	34.9 -1.6	29.68 -.36	77.6 -2.8	49.43 -.02	49.9 -1.4
25.1	56.74 +.02	37.0 1.8	19.84 +.02	33.3 1.7	29.36 .26	74.7 3.1	49.43 +.02	48.4 1.5
35.1	56.78 +.06	35.2 -1.8	19.88 +.06	31.6 -1.7	29.16 -.15	71.4 -3.4	49.47 +.05	46.8 -1.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\tau$ Aquilæ.		$\alpha^2$ Capricorni.		$\kappa$ Cephei.		$\alpha$ Pavonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 19 <sup>m</sup> 58	+ <sup>°</sup> 6 <sup>'</sup> 57	<sup>h</sup> 20 <sup>m</sup> 11	- <sup>°</sup> 12 <sup>'</sup> 53	<sup>h</sup> 20 <sup>m</sup> 12	+ <sup>°</sup> 77 <sup>'</sup> 22	<sup>h</sup> 20 <sup>m</sup> 16	- <sup>°</sup> 57 <sup>'</sup> 5
Jan. 1.1	<sup>s</sup> 38.17 +.03	" 46.9 -1.5	<sup>s</sup> 48.24 +.04	" 29.4 -0.4	<sup>s</sup> 34.64- .46	<sup>s</sup> 35.9 -3.1	<sup>s</sup> 43.55 +.02	" 39.5 +2.1
11.0	38.22 .07	45.4 1.6	48.30 .07	29.8 0.4	34.27 .29	32.7 3.3	43.60 .08	37.3 2.2
21.0	38.30 .10	43.8 1.5	48.38 .10	30.2 0.3	34.05- .10	29.3 3.4	43.72 .15	35.0 2.3
31.0	38.42 .13	42.3 1.4	48.50 .14	30.4 0.2	34.08+ .10	25.8 3.4	43.90 .21	32.7 2.3
Feb. 10.0	38.57 .16	40.9 1.3	48.65 .16	30.6 -0.1	34.28 .29	22.4 3.2	44.14 .27	30.3 2.3
19.9	38.75 +.19	39.8 -1.0	48.83 +.19	30.6 0.0	34.65+ .46	19.1 -3.1	44.44 +.32	28.1 +2.2
29.9	38.95 .22	38.9 0.7	49.04 .21	30.5 +0.2	35.20 .62	16.3 2.7	44.79 .37	25.9 2.1
Mar. 10.9	39.18 .24	38.3 0.4	49.27 .24	30.2 0.4	35.89 .76	13.8 2.2	45.18 .41	23.8 2.0
20.8	39.43 .26	38.1 -0.1	49.52 .26	29.7 0.6	36.71 .87	11.8 1.7	45.61 .45	22.0 1.8
30.8	39.69 .27	38.2 +0.3	49.79 .28	29.0 0.8	37.63 .94	10.4 1.1	46.08 .48	20.3 1.5
Apr. 9.8	39.97 +.28	38.7 +0.6	50.08 +.29	28.2 +0.9	38.60+1.00	9.7 -0.4	46.56 +.50	18.9 +1.3
19.8	40.26 .29	39.5 1.0	50.37 .30	27.2 1.1	39.61 1.00	9.6 +0.2	47.07 .51	17.8 1.0
29.7	40.55 .29	40.7 1.3	50.68 .31	26.1 1.2	40.61 .98	10.1 0.8	47.58 .51	17.0 0.7
May 9.7	40.84 .29	42.1 1.5	50.98 .30	24.9 1.2	41.57 .93	11.2 1.4	48.10 .51	16.5 +0.3
19.7	41.12 .28	43.7 1.7	51.29 .30	23.7 1.2	42.46 .85	12.9 1.9	48.60 .50	16.3 0.0
29.7	41.39 +.26	45.5 +1.8	51.58 +.28	22.4 +1.2	43.26+ .74	15.1 +2.4	49.09 +.47	16.5 -0.4
June 8.6	41.64 .24	47.4 1.9	51.85 .26	21.3 1.1	43.94 .61	17.7 2.8	49.54 .43	17.1 0.7
18.6	41.86 .21	49.3 1.9	52.10 .23	20.1 1.0	44.48 .47	20.7 3.1	49.96 .39	18.0 1.1
28.6	42.05 .17	51.2 1.9	52.31 .20	19.1 0.9	44.88 .31	23.9 3.3	50.34 .33	19.2 1.4
July 8.5	42.21 .13	53.1 1.8	52.49 .16	18.3 0.8	45.11+ .14	27.3 3.4	50.62 .26	20.7 1.6
18.5	42.32 +.09	54.9 +1.7	52.63 +.12	17.6 +0.6	45.17- .02	30.8 +3.5	50.85 +.19	22.4 -1.8
28.5	42.39 +.05	56.5 1.5	52.73 .07	17.1 0.4	45.06 .19	34.2 3.4	51.00 .11	24.4 2.0
Aug. 7.5	42.41 .00	57.9 1.3	52.78 +.03	16.7 0.3	44.79 .35	37.7 3.3	51.08 +.04	26.4 2.1
17.4	42.39 -0.4	59.1 1.2	52.78 -0.2	16.5 +0.1	44.35 .50	40.9 3.2	51.07 -0.4	28.5 2.1
27.4	42.33 .08	60.2 0.9	52.74 .06	16.5 0.0	43.77 .64	44.0 2.9	50.99 .12	30.6 2.0
Sept. 6.4	42.23 -1.1	61.0 +0.7	52.66 -1.0	16.6 -0.1	43.06- .77	46.7 +2.6	50.84 -1.8	32.6 -1.9
16.4	42.10 .14	61.5 0.4	52.55 .13	16.8 0.2	42.22 .28	49.1 2.2	50.63 .24	34.4 1.7
26.3	41.95 .16	61.9 +0.2	52.41 .15	17.1 0.3	41.30 .97	51.2 1.8	50.36 .28	35.9 1.4
Oct. 6.3	41.79 .17	61.9 0.0	52.25 .16	17.4 0.4	40.29 1.03	52.7 1.3	50.06 .31	37.1 1.0
16.3	41.61 .17	61.8 -0.3	52.08 .17	17.8 0.4	39.23 1.07	53.8 0.8	49.74 .32	37.9 0.6
26.2	41.44 -1.16	61.4 -0.5	51.92 -1.16	18.3 -0.5	38.15-1.08	54.3 +0.2	49.42 -1.32	38.4 -0.2
Nov. 5.2	41.29 .15	60.8 0.7	51.76 .15	18.7 0.5	37.08 1.06	54.3 -0.3	49.11 .30	38.3 +0.2
15.2	41.15 .12	60.0 0.9	51.63 .12	19.2 0.5	36.03 1.02	53.7 0.9	48.82 .26	37.9 0.6
25.2	41.04 .10	59.0 1.1	51.52 .09	19.7 0.5	35.04 .94	52.5 1.5	48.58 .21	37.1 1.0
Dec. 5.1	40.96 .06	57.8 1.3	51.44 .06	20.2 0.5	34.14 .84	50.7 2.0	48.40 .16	35.9 1.4
15.1	40.91 -0.03	56.4 -1.4	51.39 -0.02	20.7 -0.5	33.36- .71	48.5 -2.4	48.27 -0.09	34.3 +1.7
25.1	40.90 +0.01	54.9 1.5	51.39 +0.01	21.1 0.4	32.71 .56	45.8 2.9	48.21 -0.02	32.5 2.0
35.1	40.93 +0.05	53.4 -1.6	51.42 +0.05	21.6 -0.4	32.23- .40	42.8 -3.2	48.22 +0.05	30.4 +2.2



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Cygni.		$\pi$ Capricorni.		$\epsilon$ Delphini.		Groombridge 3241.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 20 18	+39° 53'	<sup>h</sup> <sup>m</sup> 20 20	-18° 34'	<sup>h</sup> <sup>m</sup> 20 27	+10° 55'	<sup>h</sup> <sup>m</sup> 20 30	+72° 8'
Jan. 1.1	<sup>s</sup> 10.69 -.05	61.3 -2.8	<sup>s</sup> 52.39 +.03	43.6 -0.1	<sup>s</sup> 49.86 .00	25.9 -1.6	<sup>s</sup> 26.05 -.34	78.6 -3.0
11.0	10.66 .00	58.4 2.9	52.43 .06	43.6 0.0	49.87 +.04	24.2 1.7	25.77 .22	75.5 3.2
21.0	10.69 +.05	55.4 3.0	52.51 .10	43.6 +0.1	49.93 .07	22.5 1.7	25.61 -.09	72.1 3.4
31.0	10.77 .10	52.5 2.9	52.63 .13	43.5 0.2	50.01 .10	20.8 1.6	25.59 +.04	68.6 3.4
Feb. 10.0	10.89 .14	49.6 2.7	52.78 .16	43.3 0.3	50.13 .13	19.3 1.4	25.70 .17	65.2 3.3
19.9	11.05 +.18	47.0 -2.4	52.95 +.19	42.9 +0.4	50.28 +.16	18.0 -1.2	25.94 +.30	61.9 -3.1
29.9	11.26 .22	44.8 2.1	53.16 .22	42.5 0.5	50.46 .19	16.9 0.9	26.30 .42	58.9 2.8
Mar. 10.9	11.50 .26	42.9 1.6	53.39 .24	41.9 0.7	50.67 .22	16.2 0.6	26.77 .52	56.4 2.3
20.9	11.77 .29	41.6 1.1	53.64 .26	41.2 0.8	50.90 .24	15.8 -0.2	27.33 .60	54.3 1.8
30.8	12.08 .31	40.8 -0.5	53.92 .28	40.3 0.9	51.15 .26	15.8 +0.2	27.97 .67	52.7 1.2
Apr. 9.8	12.40 +.33	40.5 +0.1	54.21 +.30	39.3 +1.0	51.42 +.28	16.1 +0.6	28.67 +.71	51.8 -0.6
19.8	12.74 .34	40.9 0.6	54.51 .31	38.2 1.1	51.70 .29	16.9 0.9	29.40 .73	51.5 +0.1
29.8	13.09 .34	41.8 1.2	54.83 .31	37.1 1.2	52.00 .29	18.0 1.3	30.14 .73	51.9 0.7
May 9.7	13.43 .34	43.3 1.7	55.14 .31	35.9 1.2	52.29 .29	19.4 1.5	30.86 .71	52.9 1.3
19.7	13.76 .32	45.1 2.1	55.46 .31	34.8 1.1	52.59 .29	21.1 1.8	31.55 .66	54.5 1.6
29.7	14.07 +.30	47.5 +2.5	55.76 +.29	33.7 +1.1	52.87 +.27	23.0 +2.0	32.18 +.59	56.5 +2.3
June 8.6	14.36 .27	50.1 2.7	56.04 .27	32.6 1.0	53.14 .25	25.0 2.1	32.73 .51	59.1 2.7
18.6	14.61 .23	53.0 3.0	56.30 .25	31.7 0.8	53.38 .23	27.1 2.1	33.20 .41	62.0 3.0
28.6	14.81 .19	56.0 3.1	56.54 .21	31.0 0.6	53.59 .19	29.3 2.1	33.56 .31	65.1 3.3
July 8.6	14.98 .14	59.1 3.1	56.73 .17	30.4 0.5	53.77 .16	31.4 2.1	33.81 .19	68.5 3.5
18.5	15.09 +.09	62.3 +3.1	56.88 +.13	30.0 +0.3	53.90 +.11	33.4 +2.0	33.94 +.07	72.1 +3.5
28.5	15.15 +.03	65.3 3.0	56.99 .09	29.8 +0.1	54.00 .07	35.3 1.8	33.95 -.05	75.6 3.5
Aug. 7.5	15.15 -.02	68.3 2.8	57.06 +.04	29.8 0.0	54.04 +.03	37.0 1.6	33.83 .17	79.1 3.4
17.4	15.10 .07	71.0 2.6	57.07 -.01	29.9 -0.2	54.05 -.02	38.6 1.4	33.60 .29	82.5 3.3
27.4	15.00 .12	73.5 2.3	57.04 .05	30.2 0.3	54.01 .06	39.9 1.2	33.26 .39	85.7 3.1
Sept. 6.4	14.86 -.16	75.6 +2.0	56.96 -.09	30.5 -0.4	53.93 -.10	40.9 +0.9	32.82 -.49	88.6 +2.8
16.4	14.68 .20	77.5 1.6	56.85 .12	31.0 0.5	53.82 .13	41.8 0.7	32.29 .57	91.2 2.4
26.3	14.46 .22	78.9 1.2	56.71 .15	31.5 0.5	53.68 .15	42.3 0.4	31.68 .64	93.4 2.0
Oct. 6.3	14.23 .24	79.9 0.8	56.56 .16	32.0 0.5	53.52 .16	42.6 +0.2	31.00 .69	95.2 1.5
16.3	13.98 .25	80.4 +0.3	56.39 .17	32.5 0.5	53.35 .17	42.6 -0.1	30.29 .72	96.4 1.0
26.2	13.73 -.25	80.5 -0.2	56.22 -.16	33.0 -0.5	53.18 -.17	42.4 -0.4	29.55 -.74	97.2 +0.4
Nov. 5.2	13.49 .24	80.1 0.6	56.06 .15	33.4 0.4	53.02 .16	41.9 0.6	28.81 .73	97.3 -0.1
15.2	13.26 .22	79.3 1.1	55.92 .13	33.8 0.4	52.87 .14	41.2 0.8	28.09 .71	96.9 0.7
25.2	13.06 .19	77.9 1.6	55.80 .10	34.2 0.3	52.74 .11	40.2 1.1	27.40 .66	96.0 1.3
Dec. 5.1	12.89 .15	76.1 2.0	55.71 .07	34.5 0.2	52.64 .09	39.0 1.3	26.77 .60	94.4 1.8
15.1	12.76 -.11	74.0 -2.3	55.66 -.03	34.7 -0.2	52.57 -.05	37.6 -1.5	26.21 -.51	92.3 -2.3
25.1	12.66 .07	71.5 2.6	55.65 +.01	34.8 0.1	52.54 -.02	36.1 1.6	25.75 .41	89.8 2.7
35.1	12.62 -.09	68.7 -2.9	55.67 +.05	34.9 -0.1	52.54 +.02	34.4 -1.7	25.39 -.30	86.9 -3.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Cygni.		$\mu$ Aquarii.		12 Year Cat. 1879.		$\nu$ Cygni.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 20 37	+44° 52'	<sup>h</sup> <sup>m</sup> 20 46	— 9° 23'	<sup>h</sup> <sup>m</sup> 20 52	+80° 7'	<sup>h</sup> <sup>m</sup> 20 52	+40° 43'
Jan. 1.1	<sup>s</sup> 34.94 —.08	57.0 —2.7	<sup>s</sup> 34.74 .00	72.9 —0.6	<sup>s</sup> 34.46 —.80	66.6 —2.7	<sup>s</sup> 58.07 —.09	77.9 —2.6
11.1	34.89 —.03	54.2 3.0	34.76 +.03	73.4 0.5	33.77 .59	63.7 3.0	58.00 —.04	75.2 2.8
21.0	34.85 +.02	51.1 3.1	34.81 .06	73.9 0.5	33.29 .36	60.5 3.3	57.99 +.01	72.4 2.9
31.0	34.92 .07	48.1 3.0	34.89 .10	74.4 0.3	33.01 —.12	57.2 3.4	58.02 .05	69.5 2.9
Feb. 10.0	35.02 .12	45.1 2.9	35.00 .13	74.6 —0.2	33.05+ .12	53.8 3.4	58.09 .10	66.6 2.8
20.9	35.16 +.17	42.3 —2.6	35.15 +.16	74.7 0.0	33.29+ .36	50.4 —3.2	58.21 +.14	64.0 —2.5
29.9	35.35 .31	39.8 2.3	35.32 .18	74.7 +0.2	33.76 .58	47.3 3.0	58.38 .19	61.5 2.2
Mar. 10.9	35.59 .96	37.7 1.8	35.52 .21	74.4 0.4	34.46 .79	44.5 2.6	58.59 .23	59.5 1.8
20.9	35.86 .29	36.1 1.3	35.74 .24	73.9 0.6	35.34 .96	42.2 2.1	58.84 .27	57.9 1.3
30.8	36.17 .22	35.0 0.8	35.99 .26	73.2 0.8	36.37 1.10	40.3 1.6	59.12 .30	56.9 0.8
Apr. 9.8	36.51 +.34	34.5 —0.2	36.26 +.28	72.4 +1.0	37.52+1.19	39.0 —1.0	59.43 +.32	56.4 —0.2
19.8	36.26 .36	34.6 +0.4	36.54 .29	71.3 1.2	38.75 1.24	38.3 —0.3	59.76 .34	56.4 +0.3
29.8	37.22 .37	35.3 1.0	36.84 .30	70.0 1.3	40.01 1.25	38.3 +0.3	60.11 .35	57.0 —0.9
May 9.7	37.59 .36	36.6 1.5	37.14 .30	68.6 1.4	41.26 1.22	38.9 0.9	60.46 .35	58.2 1.4
19.7	37.95 .35	38.3 2.0	37.45 .30	67.2 1.5	42.46 1.15	40.0 1.4	60.81 .34	59.8 1.9
29.7	38.29 +.33	40.5 +2.4	37.75 +.29	65.7 +1.5	43.56+1.05	41.8 +2.0	61.14 +.32	61.9 +2.3
June 8.7	38.60 .30	43.1 2.7	38.03 .28	64.2 1.4	44.55 .91	41.0 2.4	61.46 .30	64.4 2.6
18.6	38.83 .36	45.9 3.0	38.30 .25	62.8 1.4	45.39 .75	46.6 2.8	61.74 .27	67.1 2.9
28.6	39.12 .21	49.0 3.1	38.54 .22	61.5 1.2	46.05 .57	49.6 3.1	61.99 .22	70.1 3.0
July 8.6	39.31 .16	52.2 3.2	38.75 .19	60.3 1.1	46.52 .37	52.8 3.3	62.19 .18	73.2 3.1
18.5	39.44 +.11	55.5 +3.3	38.91 +.15	59.4 +0.9	46.80 +.17	56.3 +3.5	62.34 +.13	76.4 +3.2
28.5	39.52 +.05	58.8 3.2	39.04 .10	58.5 0.7	46.86 —.04	59.8 3.5	62.44 .07	79.5 3.1
Aug. 7.5	39.54 —.01	61.9 3.1	39.12 .06	57.9 0.5	46.71 .25	63.3 3.5	62.49 +.02	82.6 3.0
17.5	39.50 .06	64.9 2.9	39.15 +.01	57.4 0.4	46.36 .45	66.8 3.4	62.48 —.03	85.5 2.8
27.4	39.41 .11	67.6 2.6	39.14 —.03	57.2 +0.2	45.81 .64	70.2 3.3	62.42 .08	88.2 2.6
Sept. 6.4	39.27 —.16	70.1 +2.3	39.09 —.07	57.1 0.0	45.08 —.81	73.3 +3.0	62.31 —.13	90.7 +2.3
16.4	39.09 .20	72.2 1.9	39.00 .10	57.2 —0.1	44.18 .97	76.2 2.7	62.17 .17	92.8 1.9
26.4	38.87 .23	74.0 1.5	38.88 .13	57.4 0.2	43.14 1.11	78.8 2.3	61.98 .20	94.6 1.6
Oct. 6.3	38.62 .25	75.3 1.1	38.74 .15	57.7 0.3	41.97 1.22	80.9 1.9	61.77 .22	95.9 1.1
16.3	38.36 .27	76.1 0.6	38.59 .16	58.1 0.4	40.71 1.30	82.6 1.4	61.53 .24	96.9 0.7
26.3	38.09 —.27	76.5 +0.2	38.43 —.16	58.6 —0.5	39.37 —1.35	83.8 +0.9	61.29 —.24	97.4 +0.2
Nov. 5.2	37.82 .26	76.4 —0.4	38.28 .15	59.1 0.5	38.01 1.37	84.5 +0.4	61.05 .24	97.3 —0.3
15.2	37.56 .25	75.8 0.9	38.14 .13	59.6 0.6	36.64 1.35	84.5 —0.2	60.82 .23	96.8 0.7
25.2	37.32 .22	74.7 1.4	38.01 .11	60.2 0.6	35.31 1.29	84.0 0.8	60.60 .21	95.9 1.2
Dec. 5.2	37.12 .19	73.1 1.8	37.92 .08	60.8 0.6	34.05 1.20	82.9 1.4	60.41 .18	94.5 1.6
15.1	36.94 —.15	71.0 —2.2	37.85 —.05	61.4 —0.6	32.91 —1.08	81.3 —1.9	60.24 —.14	92.6 —2.0
25.1	36.81 .11	68.6 2.6	37.82 —.02	62.0 0.6	31.90 .92	79.1 2.4	60.12 .11	90.4 2.4
35.1	36.73 —06	65.9 —2.8	37.81 +.02	62.6 —0.6	31.07 —.72	76.5 —2.8	60.03 —.07	87.7 —2.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	61 Cygni.		ζ Cygni		α Cephei		1 Pegasi.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 21 <sup>m</sup> 1	<sup>°</sup> +38 <sup>'</sup> 11	<sup>h</sup> 21 <sup>m</sup> 8	<sup>°</sup> +29 <sup>'</sup> 45	<sup>h</sup> 21 <sup>m</sup> 15	<sup>°</sup> +62 <sup>'</sup> 6	<sup>h</sup> 21 <sup>m</sup> 16	<sup>°</sup> +19 <sup>'</sup> 19
Jan. 1.1	50.85 -08	63.2 -2.4	8.44 -06	69.5 -2.2	52.39 -25	51.3 -2.6	52.70 -05	35.5 -1.7
11.1	50.79 -03	60.8 2.6	8.39 -03	67.2 2.3	52.17 .18	48.5 2.9	52.66 -09	33.7 1.9
21.1	50.78 +01	58.1 2.7	8.38 +01	64.8 2.4	52.03 .11	45.4 3.2	52.66 +01	31.8 1.9
31.0	50.82 .05	55.4 2.7	8.41 .05	62.4 2.4	51.96 -03	42.2 3.3	52.69 .05	29.8 1.9
Feb. 10.0	50.89 .10	52.8 2.6	8.47 .09	60.0 2.3	51.97 +05	38.9 3.3	52.75 .08	28.0 1.8
20.0	51.01 +14	50.3 -2.4	8.58 +12	57.8 -2.1	52.06 +13	35.6 -3.1	52.85 +11	26.2 -1.6
29.9	51.18 .18	48.1 2.1	8.72 .16	55.8 1.8	52.23 .21	32.6 2.9	52.98 .15	24.8 1.3
Mar. 10.9	51.38 .22	46.2 1.7	8.90 .20	54.1 1.5	52.49 .29	29.9 2.5	53.15 .18	23.6 1.0
20.9	51.62 .26	44.7 1.2	9.11 .23	52.9 1.0	52.81 .36	27.5 2.1	53.34 .21	22.8 0.6
30.9	51.90 .29	43.8 0.7	9.36 .26	52.1 -0.5	53.20 .41	25.7 1.5	53.57 .24	22.4 -0.2
Apr. 9.8	52.21 +32	43.4 -0.2	9.63 +28	51.8 0.0	53.64 +46	24.5 -0.9	53.82 +26	22.4 +0.2
19.8	52.51 .34	43.5 +0.4	9.93 .30	52.0 +0.4	54.12 .49	23.8 -0.3	54.10 .28	22.8 0.7
29.8	52.88 .35	44.2 0.9	10.24 .32	52.7 0.9	54.62 .51	23.8 +0.3	54.39 .30	23.7 1.1
May 9.8	53.23 .35	45.4 1.4	10.56 .32	53.9 1.4	55.13 .51	24.4 0.9	54.70 .31	25.0 1.4
19.7	53.58 .35	47.1 1.9	10.88 .32	55.5 1.8	55.64 .50	25.6 1.5	55.00 .31	26.6 1.8
29.7	53.93 +33	49.2 +2.3	11.19 +31	57.5 +2.1	56.14 +47	27.4 +2.0	55.31 +30	28.5 +2.0
June 8.7	54.25 .31	51.7 2.6	11.50 .29	59.8 2.4	56.59 .43	29.6 2.4	55.60 .28	30.6 2.2
18.6	54.55 .28	54.4 2.9	11.77 .26	62.3 2.6	57.01 .38	32.3 2.8	55.88 .26	33.0 2.4
28.6	54.81 .24	57.4 3.0	12.02 .23	65.0 2.8	57.36 .32	35.3 3.1	56.13 .23	35.4 2.5
July 8.6	55.03 .20	60.5 3.2	12.23 .19	67.8 2.8	57.65 .25	38.5 3.4	56.34 .20	37.9 2.5
18.6	55.20 +15	63.7 +3.2	12.40 +15	70.7 +2.8	57.87 +16	42.0 +3.5	56.52 +16	40.3 +3.4
28.5	55.32 .10	66.9 3.1	12.53 .10	73.5 2.8	58.00 .10	45.5 3.6	56.65 .11	42.7 2.3
Aug. 7.5	55.39 +04	70.0 3.0	12.60 +05	76.2 2.6	58.06 +02	49.1 3.5	56.75 .07	45.0 2.2
17.5	55.41 -01	73.0 2.8	12.63 .00	78.7 2.4	58.04 -06	52.6 3.4	56.79 +02	47.1 2.0
27.4	55.38 .06	75.7 2.6	12.60 -04	81.1 2.2	57.93 .14	56.0 3.3	56.79 -02	49.0 1.8
Sept. 6.4	55.30 -10	78.2 +2.3	12.54 -08	83.2 +1.9	57.75 -21	59.1 +3.0	56.75 -06	50.6 +1.5
16.4	55.17 .14	80.4 2.0	12.43 .12	85.0 1.6	57.51 .28	62.0 2.7	56.67 .10	52.0 1.2
26.4	55.02 .17	82.2 1.6	12.29 .15	86.5 1.3	57.20 .33	64.6 2.4	56.55 .13	53.1 1.0
Oct. 6.3	54.83 .20	83.7 1.2	12.13 .17	87.6 1.0	56.85 .37	66.8 1.9	56.42 .15	53.9 0.7
16.3	54.62 .21	84.7 0.8	11.95 .19	88.4 0.6	56.45 .41	68.5 1.5	56.26 .16	54.4 +0.3
26.3	54.41 -22	85.3 +0.4	11.75 -19	88.7 +0.2	56.03 -43	69.7 +0.9	56.10 -17	54.6 0.0
Nov. 5.3	54.19 .21	85.4 -0.1	11.56 .19	88.7 -0.2	55.60 .43	70.4 +0.4	55.93 .16	54.5 -0.3
15.2	53.98 .20	85.1 0.5	11.37 .18	88.3 0.6	55.16 .43	70.5 -0.2	55.77 .16	54.0 0.6
25.2	53.78 .19	84.3 1.0	11.20 .16	87.4 1.0	54.74 .41	70.0 0.7	55.62 .14	53.2 0.9
Dec 5.2	53.61 .16	83.1 1.4	11.04 .14	86.2 1.4	54.34 .38	69.0 1.3	55.48 .12	52.1 1.2
15.2	53.46 -13	81.5 -1.8	10.91 -11	84.6 -1.7	53.98 -34	67.4 -1.8	55.37 -10	50.8 -1.5
25.1	53.35 .09	79.5 2.2	10.81 .08	82.7 2.0	53.66 .29	65.3 2.3	55.29 .07	49.2 1.7
35.1	53.27 -06	77.2 -2.4	10.74 -05	80.6 -2.3	53.40 -23	62.8 -2.7	55.24 -04	47.5 -1.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Aquarii.		$\beta$ Cephei.		$\xi$ Aquarii.		$\epsilon$ Pegasi.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 21 25	° ' " - 6 3	<sup>h</sup> <sup>m</sup> 21 27	° ' " +70 3	<sup>h</sup> <sup>m</sup> 21 31	° ' " - 8 21	<sup>h</sup> <sup>m</sup> 21 38	° ' " + 9 21
Jan. 1.1	<sup>s</sup> 37.92 -03	<sup>"</sup> 51.5 -0.7	<sup>s</sup> 10.49 -41	<sup>"</sup> 81.0 -2.4	<sup>s</sup> 45.54 -04	<sup>"</sup> 25.6 -0.6	<sup>s</sup> 39.47 -08	<sup>"</sup> 43.1 -1.3
11.1	37.90 .00	52.2 0.6	10.13 .32	78.3 2.8	45.52 -01	26.1 0.5	39.43 -03	41.7 1.4
21.1	37.91 +03	52.8 0.6	9.85 .22	75.3 3.1	45.52 +02	26.6 0.4	39.42 .00	40.3 1.4
31.0	37.95 .05	53.3 0.4	9.69 -11	72.1 3.3	45.56 .05	27.0 0.3	39.44 +03	39.0 1.3
Feb. 10.0	38.02 .09	53.7 0.3	9.63 +01	68.7 3.3	45.62 .08	27.2 -0.1	39.49 .06	37.7 1.2
20.0	38.13 +12	53.9 -0.1	9.70 +12	65.4 -3.3	45.72 +11	27.3 0.0	39.57 +10	36.6 -1.0
29.9	38.26 .15	53.9 +0.1	9.88 .24	62.2 3.1	45.85 .14	27.1 +0.2	39.68 .13	35.7 0.8
Mar. 10.9	38.42 .18	53.7 0.3	10.18 .34	59.3 2.7	46.00 .17	26.8 0.4	39.82 .16	35.0 0.5
20.9	38.61 .21	53.3 0.5	10.57 .44	56.7 2.3	46.19 .20	26.3 0.7	40.00 .19	34.7 -0.2
30.9	38.83 .23	52.6 0.8	11.06 .52	54.7 1.8	46.41 .23	25.5 0.9	40.21 .22	34.7 +0.2
Apr. 9.8	39.07 +26	51.7 +1.0	11.62 +59	53.2 -1.2	46.65 +25	24.5 +1.1	40.44 +25	35.0 +0.5
19.8	39.34 .28	50.6 1.3	12.24 .64	52.2 -0.6	46.91 .28	23.3 1.3	40.70 .27	35.7 0.8
29.8	39.63 .29	49.3 1.4	12.89 .66	51.9 0.0	47.20 .29	21.9 1.4	40.98 .29	36.7 1.2
May 9.8	39.93 .30	47.8 1.6	13.57 .67	52.2 +0.6	47.50 .30	20.4 1.6	41.27 .30	38.0 1.5
19.7	40.23 .30	46.2 1.6	14.24 .66	53.2 1.2	47.81 .31	18.8 1.6	41.57 .30	39.6 1.7
29.7	40.54 +30	44.5 +1.7	14.88 +62	51.7 +1.8	48.12 +30	17.1 +1.7	41.88 +30	41.4 +1.9
June 8.7	40.83 .29	42.8 1.7	15.49 .57	56.7 2.3	48.42 .29	15.4 1.6	42.17 .29	43.4 2.0
18.7	41.12 .27	41.2 1.6	16.03 .50	59.2 2.7	48.70 .28	13.8 1.6	42.45 .27	45.5 2.1
28.6	41.38 .25	39.6 1.5	16.50 .42	62.0 3.0	48.97 .25	12.3 1.5	42.72 .25	47.7 2.1
July 8.6	41.61 .21	38.1 1.4	16.88 .33	65.2 3.3	49.21 .22	10.9 1.3	42.95 .22	49.8 2.1
18.6	41.81 +18	36.8 +1.2	17.16 +22	68.6 +3.5	49.42 +18	9.7 +1.1	43.15 +18	51.9 +2.0
28.5	41.96 .14	35.7 1.0	17.34 .12	72.2 3.6	49.58 .14	8.7 0.9	43.31 .14	53.8 1.9
Aug. 7.5	42.08 .09	34.7 0.8	17.42 +02	75.8 3.6	49.70 .10	7.9 0.7	43.43 .10	55.6 1.7
17.5	42.15 +05	34.0 0.6	17.38 -09	79.5 3.6	49.78 .05	7.3 0.5	43.50 .05	57.3 1.5
27.5	42.17 .00	33.5 0.4	17.24 .19	83.0 3.4	49.81 +01	6.9 0.3	43.53 +01	58.7 1.3
Sept. 6.4	42.15 -04	33.2 +0.2	17.00 -28	86.3 +3.2	49.80 -03	6.7 +0.1	43.52 -03	59.9 +1.1
16.4	42.10 .07	33.1 0.0	16.67 .37	89.4 3.0	49.75 .07	6.7 -0.1	43.47 .07	60.8 0.9
26.4	42.01 .10	33.2 -0.1	16.26 .45	92.3 2.6	49.67 .10	6.9 0.2	43.38 .10	61.5 0.6
Oct. 6.4	41.90 .12	33.4 0.3	15.77 .52	94.7 2.2	49.56 .12	7.2 0.4	43.27 .12	62.0 0.3
16.3	41.76 .14	33.7 0.4	15.23 .57	96.7 1.8	49.42 .14	7.6 0.5	43.14 .14	62.2 +0.1
26.3	41.62 -14	34.1 -0.5	14.64 -60	98.3 +1.3	49.28 -14	8.1 -0.5	43.00 -15	62.2 -0.1
Nov. 5.3	41.47 .14	34.6 0.6	14.03 .62	99.3 0.7	49.14 .14	8.7 0.6	42.85 .15	62.0 0.4
15.2	41.33 .14	35.3 0.6	13.41 .63	99.7 +0.1	49.00 .13	9.3 0.6	42.70 .14	61.5 0.6
25.2	41.20 .12	35.9 0.7	12.78 .61	99.5 -0.5	48.87 .12	9.9 0.6	42.57 .13	60.8 0.8
Dec. 5.2	41.09 .10	36.6 0.7	12.18 .58	98.8 1.0	48.75 .10	10.6 0.6	42.44 .11	60.0 1.0
15.2	41.00 -08	37.3 -0.7	11.62 -53	97.4 -1.6	48.66 -08	11.2 -0.6	42.34 -09	58.9 -1.1
25.1	40.94 .05	38.0 0.7	11.13 .46	95.6 2.1	48.60 .05	11.8 0.6	42.26 .07	57.7 1.2
35.1	40.90 -02	38.7 -0.7	10.70 -38	93.2 -2.6	48.56 -02	12.4 -0.6	42.21 -04	56.4 -1.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	11 Cephei.		$\mu$ Capricorni.		79 Draconis.		$\alpha$ Aquarii.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 21 40	+70° 47'	<sup>h</sup> <sup>m</sup> 21 47	−14° 4'	<sup>h</sup> <sup>m</sup> 21 51	+73° 10'	<sup>h</sup> <sup>m</sup> 22 0	−0° 51'
Jan. 1.1	<sup>s</sup> 14.72 −.45	57.8 −2.3	<sup>s</sup> 9.51 −.04	48.8 −0.3	<sup>s</sup> 26.07 −.55	34.3 −2.1	<sup>s</sup> 0.23 −.06	52.1 −0.9
11.1	14.31 .36	55.3 2.7	9.47 −.03	49.1 0.2	25.56 .46	32.0 2.6	0.18 .03	52.9 0.8
21.1	13.99 .96	52.4 3.0	9.47 +.01	49.2 −0.1	25.16 .35	29.2 2.9	0.16 −.01	53.7 0.8
31.1	13.78 .15	49.2 3.2	9.49 .04	49.2 +0.1	24.87 .22	26.1 3.2	0.17 +.02	54.5 0.7
Feb. 10.0	13.69 −.03	45.9 3.3	9.55 .07	49.0 0.2	24.72 −.09	22.9 3.3	0.20 .05	55.1 0.6
20.0	13.72 +.09	42.6 −3.3	9.63 +.10	48.7 +0.4	24.70 +.05	19.5 −3.3	0.26 +.08	55.6 −0.4
Mar. 1.0	13.87 .21	39.3 3.1	9.75 .13	48.2 0.6	24.82 .19	16.3 3.2	0.36 .11	55.9 −0.2
10.9	14.13 .32	36.4 2.8	9.89 .16	47.5 0.8	25.08 .32	13.2 2.9	0.48 .14	55.9 +0.1
20.9	14.51 .43	33.7 2.4	10.07 .19	46.6 1.0	25.47 .45	10.5 2.5	0.64 .17	55.7 0.3
30.9	14.99 .52	31.5 1.9	10.28 .22	45.5 1.2	25.98 .55	8 1 2.1	0.83 .20	55.2 0.6
Apr. 9.9	15.55 +.59	29.9 −1.4	10.52 +.25	44.3 +1.3	26.58 +.64	6.3 −1.6	1.05 +.23	54.5 +0.9
19.8	16.17 .65	28.8 0.8	10.78 .27	42.9 1.5	27.27 .71	5.0 1.0	1.30 .26	53.5 1.1
29.8	16.84 .68	28.3 −0.2	11.06 .29	41.3 1.6	28.01 .76	4.3 −0.4	1.57 .28	52.2 1.4
May 9.8	17.53 .69	28.5 +0.4	11.36 .31	39.7 1.6	28.78 .78	4.3 +0.3	1.85 .29	50.7 1.6
19.8	18.23 .69	29.2 1.0	11.68 .31	38.0 1.7	29.56 .77	4.9 0.9	2.15 .30	49.0 1.7
29.7	18.91 +.66	30.5 +1.6	11.99 +.31	36.4 +1.6	30.33 +.75	6 0 +1.4	2.46 +.31	47.3 +1.8
June 8.7	19.55 .61	32.4 2.1	12.31 .31	34.8 1.6	31.06 .70	7.8 2.0	2.77 .30	45.4 1.9
18.7	20.13 .55	34.8 2.6	12.61 .29	33.3 1.4	31.72 .63	10.0 2.4	3.06 .28	43.5 1.9
28.6	20.64 .47	37.5 2.9	12.89 .27	31.9 1.3	32.31 .54	12.6 2.6	3.34 .26	41.6 1.8
July 8.6	21.06 .37	40.6 3.2	13.15 .24	30.7 1.1	32.81 .44	15.6 3.1	3.59 .24	39.9 1.7
18.6	21.39 +.27	44.0 +3.4	13.37 +.20	29.7 +0.9	33.20 +.33	18.9 +3.4	3.81 +.20	38.2 +1.6
28.6	21.61 .17	47.5 3.6	13.55 .16	29.0 0.6	33.47 .21	22.4 3.6	3.99 .16	36.7 1.4
Aug. 7.5	21.72 +.06	51.2 3.7	13.69 .12	28.4 0.4	33.63 +.09	26.0 3.7	4.13 .12	35.4 1.2
17.5	21.73 −.05	54.8 3.6	13.79 .07	28.2 +0.2	33.65 −.03	29.7 3.7	4.23 .08	34.3 1.0
27.5	21.62 .16	58.4 3.5	13.84 +.03	28.1 0.0	33.57 .14	33.4 3.6	4.29 +.03	33.5 0.8
Sept. 6.5	21.41 −.26	61.9 +3.3	13.84 −.02	28.2 −0.2	33.36 −.27	36.9 +3.4	4.30 −.01	32.8 +0.5
16.4	21.11 .35	65.1 3.1	13.81 .05	28.5 0.4	33.04 .37	40.2 3.2	4.27 .04	32.4 0.3
26.4	20.71 .44	68.0 2.8	13.73 .09	29.0 0.5	32.61 .47	43.3 2.9	4.21 .07	32.1 +0.1
Oct. 6.4	20.23 .51	70.7 2.4	13.63 .11	29.5 0.6	32.10 .55	46.1 2.5	4.12 .10	32.1 −0.1
16.3	19.70 .56	72.9 2.0	13.51 .13	30.2 0.7	31.51 .62	48.5 2.1	4.01 .12	32.3 0.2
26.3	19.11 −.61	74.6 +1.5	13.37 −.14	30.9 −0.7	30.85 −.68	50.4 +1.7	3.88 −.13	32.5 −0.4
No. 5.3	18.48 .63	75.8 0.9	13.23 .14	31.6 0.7	30.15 .72	51.8 1.1	3.75 .14	33.0 0.5
15.3	17.84 .64	76.4 +0.4	13.09 .14	32.2 0.6	29.42 .73	52.6 +0.6	3.61 .13	33.5 0.6
25.2	17.20 .63	76.5 −0.2	12.96 .13	32.9 0.6	28.68 .73	52.9 0.0	3.48 .13	34.2 0.7
Dec. 5.2	16.57 .61	75.9 0.8	12.84 .11	33.4 0.5	27.96 .71	52.6 −0.6	3.36 .11	34.9 0.7
15.2	15.99 −.56	74.8 −1.4	12.74 −.09	33.9 −0.4	27.26 −.67	51.6 −1.2	3.26 −.09	35.7 −0.8
25.1	15.45 .50	73.1 1.9	12.66 .06	34.3 0.4	26.62 .60	50.1 1.8	3.17 .07	36.5 0.8
35.1	14.99 −.43	70.9 −2.5	12.62 −.03	34.6 −0.3	26.06 −.52	48.1 −2.3	3.11 −.05	37.4 −0.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Gruis.		$\theta$ Aquarii.		$\pi$ Aquarii.		$\eta$ Aquarii.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 22 <sup>m</sup> 1	<sup>°</sup> —47 <sup>'</sup> 29	<sup>h</sup> 22 <sup>m</sup> 10	<sup>°</sup> —8 <sup>'</sup> 20	<sup>h</sup> 22 <sup>m</sup> 19	<sup>°</sup> +0 <sup>'</sup> 48	<sup>h</sup> 22 <sup>m</sup> 29	<sup>°</sup> —0 <sup>'</sup> 41
Jan. 1.1	7.63 —.11	83.9 +1.2	53.73 —.07	31.8 —0.6	31.90 —.07	30.4 —0.9	34.57 —.08	44.2 —0.8
11.1	7.54 .07	82.5 1.5	53.67 .04	32.4 0.5	31.84 .05	29.5 0.9	34.49 .06	45.1 0.8
21.1	7.49 —.02	80.9 1.8	53.64 —.02	32.8 0.4	31.80 —.03	28.7 0.8	34.44 .03	45.8 0.7
31.1	7.49 +.02	78.9 2.0	53.64 +.01	33.1 0.2	31.79 .00	27.9 0.7	34.42 —.01	46.5 0.6
Feb. 10.0	7.54 .07	76.8 2.2	53.67 .04	33.3 —0.1	31.80 +.03	27.2 0.6	34.42 +.02	47.1 0.5
20.0	7.63 +.11	74.5 +2.4	53.72 +.07	33.3 +0.1	31.85 +.06	26.7 —0.4	34.46 +.05	47.6 —0.3
Mar. 1.0	7.77 .16	72.1 2.5	53.81 .10	33.1 0.3	31.92 .09	26.3 —0.2	34.52 .08	47.8 —0.1
11.0	7.95 .20	69.6 2.5	53.93 .13	32.7 0.5	32.03 .12	26.2 0.0	34.62 .11	47.8 +0.2
20.9	8.17 .25	67.1 2.5	54.09 .16	32.0 0.6	32.17 .16	26.3 +0.2	34.75 .15	47.6 0.4
30.9	8.44 .29	64.6 2.4	54.27 .20	31.1 1.0	32.34 .19	26.7 0.6	34.91 .18	47.1 0.6
Apr. 9.9	8.75 +.33	62.2 +2.3	54.48 +.23	30.0 +1.2	32.54 +.22	27.4 +0.8	35.11 +.21	46.3 +0.9
19.8	9.09 .36	59.9 2.2	54.73 .25	28.7 1.4	32.78 .25	28.4 1.1	35.34 .24	45.3 1.1
29.8	9.47 .39	57.8 2.0	54.93 .27	27.2 1.6	33.04 .27	29.6 1.3	35.59 .27	44.0 1.4
May 9.8	9.87 .41	55.9 1.7	55.28 .29	25.6 1.7	33.32 .29	31.1 1.6	35.87 .29	42.5 1.6
19.8	10.29 .42	54.3 1.5	55.60 .30	23.9 1.8	33.61 .30	32.8 1.7	36.17 .30	40.8 1.8
29.7	10.71 +.42	53.0 +1.1	55.90 +.31	22.1 +1.8	33.92 +.31	34.6 +1.9	36.47 +.31	39.0 +1.9
June 8.7	11.14 .41	52.0 0.8	56.21 .30	20.3 1.8	34.23 .30	36.5 1.9	36.78 .31	37.1 1.9
18.7	11.55 .40	51.5 +0.4	56.51 .29	18.6 1.7	34.53 .29	38.4 1.9	37.08 .30	35.1 1.9
28.7	11.94 .37	51.3 0.0	56.80 .27	16.9 1.6	34.81 .27	40.4 1.9	37.37 .28	33.2 1.9
July 8.6	12.29 .34	51.5 —0.4	57.07 .25	15.4 1.4	35.07 .25	42.2 1.8	37.64 .25	31.4 1.8
18.6	12.61 +.20	52.1 —0.8	57.30 +.21	14.0 +1.2	35.31 +.21	44.0 +1.7	37.88 +.22	29.7 +1.6
28.6	12.88 .24	53.0 1.1	57.50 .17	12.9 1.0	35.50 .18	45.6 1.5	38.09 .19	28.1 1.5
Aug. 7.5	13.08 .18	54.3 1.4	57.65 .13	12.0 0.8	35.66 .14	47.0 1.3	38.26 .15	26.7 1.3
17.5	13.23 .19	55.8 1.7	57.76 .09	11.3 0.6	35.78 .10	48.3 1.1	38.38 .11	25.6 1.0
27.5	13.31 +.05	57.6 1.8	57.83 +.05	10.9 0.3	35.85 .05	49.3 0.9	38.47 .06	24.6 0.8
Sept. 6.5	13.33 —.01	59.5 —2.0	57.85 .00	10.6 +0.1	35.88 +.01	50.0 +0.7	38.51 +.02	23.9 +0.6
16.4	13.29 .07	61.5 2.0	57.84 —.04	10.6 —0.1	35.88 —.02	50.6 0.5	38.51 —.02	23.5 0.4
26.4	13.19 .19	63.5 1.9	57.79 .07	10.8 0.3	35.83 .06	50.9 +0.2	38.48 .05	23.2 +0.2
Oct. 6.4	13.05 .16	65.4 1.8	57.71 .10	11.2 0.4	35.76 .09	51.1 0.0	38.41 .08	23.1 0.0
16.4	12.86 .20	67.1 1.6	57.60 .12	11.6 0.5	35.66 .11	51.0 —0.1	38.32 .10	23.3 —0.2
26.3	12.65 —.22	68.5 —1.3	57.48 —.13	12.2 —0.6	35.54 —.12	50.8 —0.3	38.21 —.11	23.6 —0.4
Nov. 5.3	12.43 .23	69.7 1.0	57.35 .14	12.8 0.7	35.42 .13	50.4 0.4	38.09 .12	24.0 0.5
15.3	12.20 .22	70.4 0.6	57.22 .13	13.5 0.7	35.29 .13	49.9 0.6	37.96 .13	24.5 0.6
25.2	11.98 .21	70.8 —0.2	57.09 .13	14.2 0.7	35.16 .13	49.3 0.7	37.84 .12	25.1 0.7
Dec. 5.2	11.78 .19	70.8 +0.2	56.97 .12	14.8 0.7	35.03 .11	48.5 0.8	37.72 .11	25.9 0.7
15.2	11.60 —.16	70.4 +0.6	56.87 —.10	15.5 —0.6	34.93 —.10	47.7 —0.8	37.61 —.10	26.6 —0.8
25.2	11.45 .13	69.7 1.0	56.78 .08	16.1 0.6	34.83 .08	46.9 0.9	37.51 .09	27.4 0.8
35.1	11.34 —.08	68.5 +1.3	56.72 —.06	16.7 —0.5	34.76 —.07	46.0 —0.9	37.43 —.07	28.2 —0.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	226 Cephei (B.)		ζ Pegasi.		ι Cephei.		λ Aquarii.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 22 <sup>m</sup> 30	<sup>°</sup> +75 <sup>'</sup> 38	<sup>h</sup> 22 <sup>m</sup> 35	<sup>°</sup> +10 <sup>'</sup> 14	<sup>h</sup> 22 <sup>m</sup> 45	<sup>°</sup> +65 <sup>'</sup> 36	<sup>h</sup> 22 <sup>m</sup> 46	<sup>°</sup> - 8 <sup>'</sup> 10
Jan. 1.2	<sup>s</sup> 16.75 -73	<sup>"</sup> 71.5 -1.6	<sup>s</sup> 51.20 -09	<sup>"</sup> 48.1 -1.9	<sup>s</sup> 40.36 -41	<sup>"</sup> 53.9 -1.4	<sup>s</sup> 44.81 -09	<sup>"</sup> 38.0 -0.6
11.1	16.05 .84	69.6 2.1	51.12 .07	46.9 1.2	39.97 .37	52.1 2.0	44.73 .07	38.5 0.5
21.1	15.46 .53	67.2 2.6	51.06 .05	45.7 1.2	39.63 .31	49.9 2.5	44.67 .05	38.9 0.3
31.1	14.98 .40	64.5 2.9	51.02 -02	44.5 1.2	39.36 .23	47.2 2.8	44.64 -02	39.2 -0.2
Feb. 10.1	14.65 .26	61.4 3.1	51.02 +01	43.3 1.1	39.17 .15	44.3 3.0	44.63 .00	39.3 0.0
20.0	14.47 -10	58.2 -3.2	51.04 +04	42.2 -1.0	39.05 -06	41.2 -3.1	44.65 +03	39.3 +0.2
Mar. 1.0	14.45 +06	54.9 3.2	51.09 .07	41.3 0.8	39.04 +03	38.1 3.1	44.70 .07	39.0 0.4
11.0	14.60 .23	51.8 3.1	51.18 .11	40.7 0.5	39.11 .12	35.0 2.9	44.78 .10	38.6 0.6
20.9	14.91 .38	48.8 2.8	51.30 .14	40.3 -0.2	39.29 .22	32.2 2.7	44.90 .13	37.9 0.8
30.9	15.37 .53	46.1 2.4	51.46 .18	40.2 +0.1	39.55 .31	29.6 2.3	45.05 .17	36.9 1.0
Apr. 9.9	15.96 +65	43.9 -2.0	51.65 +21	40.4 +0.4	39.91 +38	27.5 -1.9	45.23 +20	35.8 +1.3
19.9	16.67 .75	42.2 1.5	51.88 .24	41.0 0.7	40.33 .46	25.9 1.4	45.45 .23	34.4 1.5
29.8	17.47 .83	41.0 0.9	52.13 .27	41.9 1.1	40.82 .51	24.8 0.8	45.70 .26	32.9 1.6
May 9.8	18.33 .88	40.4 -0.3	52.41 .29	43.1 1.4	41.36 .55	24.2 -0.2	45.97 .28	31.2 1.8
19.8	19.22 .90	40.5 +0.3	52.71 .30	44.6 1.6	41.93 .58	21.3 +0.4	46.26 .30	29.3 1.9
29.8	20.13 +89	41.1 +0.9	53.01 +31	46.3 +1.8	42.51 +58	25.0 +0.9	46.57 +31	27.4 +1.9
June 8.7	21.01 .86	42.3 1.5	53.32 .31	48.3 2.0	43.09 .57	26.2 1.5	46.88 .31	25.5 1.9
18.7	21.85 .80	44.0 2.0	53.63 .30	50.3 2.1	43.65 .54	28.0 2.0	47.19 .31	23.7 1.8
28.7	22.61 .72	46.3 2.5	53.92 .28	52.5 2.2	44.17 .50	30.2 2.4	47.49 .29	21.9 1.7
July 8.6	23.29 .62	48.9 2.9	54.19 .26	54.6 2.3	44.65 .44	32.8 2.8	47.77 .27	20.3 1.6
18.6	23.86 +51	52.0 +3.2	54.43 +22	56.8 +2.1	45.06 +38	35.8 +3.1	48.03 +24	18.8 +1.4
28.6	24.31 .38	55.3 3.4	54.61 .19	58.8 2.0	45.40 .30	39.1 3.4	48.26 .21	17.5 1.1
Aug. 7.6	24.63 .25	58.8 3.6	54.81 .15	60.8 1.8	45.67 .22	42.5 3.5	48.45 .17	16.5 0.9
17.5	24.81 +12	62.4 3.7	54.94 .11	62.5 1.7	45.85 .14	46.1 3.6	48.59 .13	15.7 0.7
27.5	24.86 -02	66.1 3.7	55.02 .06	64.1 1.5	45.94 +05	49.8 3.6	48.70 .08	15.2 0.4
Sept. 6.5	24.77 -16	69.8 +3.6	55.07 +02	65.5 +1.2	45.96 -03	53.4 +3.5	48.76 +04	14.9 +0.2
16.5	24.54 .29	73.4 3.5	55.07 -01	66.6 1.0	45.89 .11	56.9 3.4	48.78 .00	14.9 -0.1
26.4	24.19 .41	76.9 3.3	55.04 .05	67.5 0.8	45.73 .19	60.2 3.2	48.76 -03	15.0 0.2
Oct. 6.4	23.72 .52	80.0 3.0	54.97 .08	68.1 0.5	45.51 .26	63.2 2.9	48.71 .06	15.3 0.4
16.4	23.15 .62	82.9 2.6	54.89 .10	68.5 0.3	45.23 .31	66.0 2.6	48.63 .09	15.8 0.5
26.3	22.48 -70	85.3 +2.2	54.77 -12	68.7 +0.1	44.88 -36	68.4 +2.1	48.53 -11	16.4 -0.6
Nov. 5.3	21.74 .77	87.3 1.7	54.65 .13	68.6 -0.2	44.49 .41	70.3 1.7	48.42 .12	17.1 0.7
15.3	20.94 .82	88.8 1.2	54.52 .13	68.4 0.4	44.07 .44	71.7 1.2	48.30 .12	17.8 0.7
25.3	20.10 .84	89.7 +0.6	54.39 .13	67.9 0.6	43.62 .45	72.6 +0.6	48.17 .12	18.5 0.7
Dec. 5.2	19.25 .85	90.0 0.0	54.26 .12	67.2 0.8	43.16 .46	72.9 0.0	48.05 .12	19.2 0.7
15.2	18.40 -83	89.7 -0.6	54.15 -11	66.4 -0.9	42.70 -45	72.6 -0.6	47.94 -11	19.9 -0.7
25.2	17.59 .78	88.8 1.2	54.04 .10	65.4 1.0	42.25 .43	71.7 1.2	47.84 .09	20.6 0.6
35.2	16.84 -70	87.2 -1.8	53.95 -08	64.3 -1.2	41.83 -39	70.3 -1.7	47.75 -06	21.1 -0.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Piscis Australis. (Fomalhaut.)		$\alpha$ Pegasi. (Markab.)		$\alpha$ Cephei.		$\theta$ Piscium.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 22 <sup>m</sup> 51	<sup>°</sup> —30 <sup>'</sup> 12	<sup>h</sup> 22 <sup>m</sup> 59	<sup>°</sup> +14 <sup>'</sup> 36	<sup>h</sup> 23 <sup>m</sup> 13	<sup>°</sup> +67 <sup>'</sup> 29	<sup>h</sup> 23 <sup>m</sup> 22	<sup>°</sup> + 5 <sup>'</sup> 45
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
Jan. 1.2	25.84 —.11	69.6 +0.2	9.69 —.11	9.9 —1.2	60.90 —.47	69.2 —1.1	16.02 —.11	45.9 —0.9
11.2	25.75 .08	69.3 0.5	9.59 .09	8.7 1.2	60.45 .43	67.8 1.7	15.92 .09	45.0 0.9
21.1	25.68 .06	68.6 0.8	9.51 .07	7.4 1.3	60.03 .38	65.9 2.2	15.84 .08	44.1 0.9
31.1	25.63 —.03	67.7 1.0	9.45 .05	6.1 1.3	59.68 .31	63.5 2.5	15.77 .06	43.2 0.9
Feb. 10.1	25.62 .00	66.6 1.3	9.42 —.02	4.7 1.3	59.41 .23	60.8 2.8	15.72 .03	42.4 0.8
20.1	25.64 +.03	65.2 +1.5	9.42 +.01	3.5 —1.2	59.22 —.14	57.9 —3.0	15.70 —.01	41.7 —0.6
Mar. 1.0	25.69 .07	63.6 1.7	9.45 .05	2.4 1.0	59.12 —.04	54.8 3.1	15.71 +.02	41.1 0.5
11.0	25.77 .11	61.8 1.9	9.51 .08	1.5 0.8	59.13 +.06	51.7 3.0	15.75 .06	40.8 —0.3
21.0	25.90 .14	59.9 2.0	9.61 .12	0.8 0.5	59.25 .17	48.8 2.8	15.83 .09	40.7 0.0
30.9	26.06 .18	57.8 2.1	9.74 .16	0.5 —0.2	59.47 .27	46.1 2.5	15.94 .13	40.8 +0.3
Apr. 9.9	26.27 +.22	55.7 +2.2	9.92 +.19	0.4 +0.1	59.79 +.36	43.7 —2.1	16.09 +.17	41.2 +0.6
19.9	26.50 .25	53.4 2.2	10.13 .23	0.7 0.5	60.19 .45	41.8 1.7	16.28 .20	42.0 0.9
29.9	26.78 .28	51.2 2.2	10.37 .26	1.4 0.9	60.68 .52	40.3 1.2	16.50 .24	43.0 1.2
May 9.8	27.08 .31	49.0 2.1	10.64 .28	2.5 1.2	61.23 .57	39.5 —0.6	16.76 .27	44.3 1.4
19.8	27.40 .33	46.9 2.0	10.94 .30	3.8 1.5	61.82 .60	39.2 0.0	17.03 .29	45.8 1.6
29.8	27.74 +.35	45.0 +1.8	11.24 +.31	5.4 +1.8	62.44 +.62	39.5 +0.6	17.33 +.30	47.5 +1.8
June 8.8	28.09 .35	43.2 1.6	11.56 .31	7.3 2.0	63.07 .62	40.3 1.1	17.64 .31	49.4 1.9
18.7	28.44 .34	41.7 1.4	11.87 .30	9.4 2.1	63.68 .60	41.7 1.6	17.94 .31	51.4 2.0
28.7	28.78 .33	40.5 1.1	12.17 .29	11.5 2.2	64.27 .57	43.6 2.1	18.25 .30	53.5 2.0
July 8.7	29.10 .31	39.6 0.7	12.45 .27	13.8 2.3	64.82 .52	45.9 2.5	18.54 .28	55.5 2.0
18.6	29.39 +.28	39.0 +0.4	12.71 +.24	16.0 +2.2	65.31 +.46	48.7 +2.9	18.81 +.26	57.5 +1.9
28.6	29.65 .24	38.8 0.0	12.94 .21	18.3 2.2	65.74 .38	51.7 3.2	19.05 .23	59.4 1.8
Aug. 7.6	29.87 .20	39.0 —0.3	13.12 .17	20.4 2.1	66.08 .30	55.1 3.4	19.26 .19	61.2 1.7
17.6	30.04 .15	39.4 0.6	13.27 .13	22.4 1.9	66.35 .22	58.6 3.6	19.43 .15	62.8 1.5
27.5	30.17 .10	40.2 0.9	13.38 .09	24.2 1.7	66.52 .13	62.2 3.6	19.57 .11	64.1 1.3
Sept. 6.5	30.25 +.05	41.2 —1.1	13.45 +.05	25.8 +1.5	66.61 +.04	65.9 +3.6	19.66 +.07	65.3 +1.0
16.5	30.28 .00	42.4 1.3	13.48 +.01	27.2 1.3	66.61 —.04	69.5 3.5	19.71 +.03	66.2 0.8
26.4	30.26 —.04	43.7 1.4	13.46 —.03	28.4 1.1	66.52 .13	72.9 3.4	19.73 .00	66.9 0.6
Oct. 6.4	30.20 .07	45.2 1.5	13.42 .06	29.3 0.8	66.35 .22	76.2 3.2	19.71 —.03	67.3 0.4
16.4	30.11 .10	46.7 1.4	13.35 .08	30.0 0.5	66.11 .28	79.3 2.9	19.66 .06	67.6 +0.1
26.4	29.99 —.13	48.1 —1.4	13.25 —.10	30.4 +0.3	65.80 —.34	81.9 +2.5	19.59 —.08	67.6 —0.1
Nov. 5.3	29.85 .14	49.4 1.2	13.14 .12	30.6 0.0	65.43 .40	84.2 2.1	19.50 .10	67.4 0.2
15.3	29.71 .15	50.5 1.2	13.02 .13	30.5 —0.2	65.01 .44	86.1 1.6	19.39 .11	67.1 0.4
25.3	29.55 .15	51.4 0.8	12.89 .13	30.2 0.4	64.55 .47	87.4 1.0	19.28 .11	66.7 0.5
Dec. 5.3	29.40 .14	52.1 0.5	12.76 .13	29.7 0.6	64.07 .49	88.1 +0.4	19.16 .12	66.1 0.6
15.2	29.26 —.13	52.5 —0.3	12.64 —.12	28.9 —0.8	63.57 —.49	88.2 —0.2	19.05 —.11	65.4 —0.7
25.2	29.14 .12	52.6 0.0	12.52 .11	28.0 1.0	63.08 .48	87.8 0.7	18.93 .11	64.6 0.8
35.2	29.03 —.10	52.4 +0.3	12.42 —.10	26.9 —1.2	62.60 —.46	86.8 —1.3	18.83 —.10	63.7 —0.9



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	♈ Piscium.		γ Cephei.		Groombridge 4163.		♊ Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 23 34 <sup>m</sup>	<sup>°</sup> + 5 <sup>'</sup> 1	<sup>h</sup> 23 34 <sup>m</sup>	<sup>°</sup> + 77 <sup>'</sup> 0	<sup>h</sup> 23 49 <sup>m</sup>	<sup>°</sup> + 73 <sup>'</sup> 46	<sup>h</sup> 23 53 <sup>m</sup>	<sup>°</sup> + 6 <sup>'</sup> 14
Jan. 1.2	10.27 -10	5.4 -0.9	44.71 -89	40.3 -0.7	23.20 -72	87.3 -0.5	32.62 -11	31.4 -0.9
11.2	10.17 .10	4.5 0.9	43.83 .85	39.3 1.3	22.50 .67	86.5 1.1	32.51 .10	30.5 0.8
21.2	10.08 .08	3.6 0.8	43.02 .77	37.8 1.8	21.85 .62	85.0 1.7	32.40 .10	29.7 0.8
31.1	10.00 .07	2.8 0.8	42.30 .66	35.7 2.3	21.26 .54	83.1 2.2	32.31 .08	28.9 0.8
Feb. 10.1	9.94 .04	2.0 0.7	41.70 .53	33.1 2.7	20.76 .45	80.7 2.6	32.24 .06	28.1 0.7
20.1	9.91 -0.2	1.4 -0.6	41.24 -37	30.3 -3.0	20.37 -33	78.0 -2.9	32.19 -0.4	27.4 -0.6
Mar. 1.1	9.91 +0.1	0.9 0.4	40.96 .90	27.2 3.1	20.10 .20	75.0 3.0	32.17 -0.1	26.9 0.4
11.0	9.94 .05	0.6 -0.2	40.84 -0.2	24.1 3.1	19.98 -0.5	71.9 3.1	32.18 +0.3	26.5 -0.2
21.0	10.01 .08	0.5 0.0	40.92 +1.6	21.0 3.0	20.00 +0.9	68.8 3.0	32.23 .06	26.4 0.0
31.0	10.11 .12	0.7 +0.3	41.17 .34	18.0 2.8	20.17 .24	65.9 2.8	32.31 .10	26.5 +0.2
Apr. 9.9	10.25 +1.6	1.1 +0.6	41.60 +5.0	15.3 -2.5	20.47 +3.8	63.2 -2.5	32.43 +1.4	26.9 +0.5
19.9	10.43 .20	1.9 0.9	42.18 .65	12.9 2.1	20.92 .50	60.8 2.1	32.60 .18	27.6 0.8
29.9	10.65 .23	2.9 1.2	42.90 .78	11.1 1.6	21.48 .61	58.9 1.7	32.80 .22	28.5 1.1
May 9.9	10.89 .26	4.2 1.4	43.74 .68	9.7 1.1	22.14 .70	57.5 1.2	33.03 .25	29.7 1.3
19.8	11.16 .28	5.7 1.6	44.66 .95	8.9 -0.5	22.88 .77	56.6 -0.6	33.29 .27	31.2 1.6
29.8	11.46 +3.0	7.4 +1.8	45.63 +9.9	8.7 +0.1	23.67 +8.1	56.3 0.0	33.58 +2.9	32.9 +1.8
June 8.8	11.76 .31	9.3 1.9	46.63 1.00	9.1 0.6	24.50 .83	56.5 +0.5	33.88 .30	34.7 1.9
18.8	12.08 .31	11.3 2.0	47.63 .98	10.0 1.2	25.33 .82	57.3 1.1	34.19 .31	36.7 2.0
28.7	12.38 .30	13.3 2.0	48.59 .93	11.5 1.7	26.14 .79	58.7 1.6	34.50 .31	38.7 2.0
July 8.7	12.68 .29	15.3 2.0	49.49 .86	13.5 2.2	26.91 .74	60.6 2.1	34.80 .29	40.8 2.0
18.7	12.96 +2.6	17.3 +1.9	50.32 +7.7	15.9 +2.6	27.63 +6.8	62.9 +2.5	35.09 +2.7	42.8 +2.0
28.6	13.21 .24	19.2 1.8	51.04 .67	18.8 3.0	28.27 .60	65.6 2.8	35.35 .25	44.7 1.8
Aug. 7.6	13.43 .20	20.9 1.6	51.65 .55	21.9 3.3	28.82 .50	68.7 3.1	35.58 .22	46.5 1.7
17.6	13.61 .16	22.4 1.4	52.13 .41	25.3 3.5	29.27 .40	72.0 3.4	35.78 .18	48.1 1.5
27.6	13.75 .12	23.8 1.2	52.48 .27	29.0 3.7	29.62 .29	75.5 3.6	35.95 .14	49.5 1.3
Sept. 6.5	13.86 +0.8	24.9 +1.0	52.68 +1.3	32.7 +3.7	29.85 +1.7	79.2 +3.7	36.07 +1.0	50.7 +1.1
16.5	13.92 .05	25.7 0.8	52.73 -0.2	36.5 3.7	29.96 +0.6	82.9 3.7	36.15 .07	51.7 0.8
26.5	13.95 +0.1	26.4 0.5	52.65 .16	40.2 3.6	29.96 -0.6	86.8 3.6	36.20 +0.3	52.4 0.6
Oct. 6.4	13.95 -0.2	26.8 0.3	52.42 .29	43.7 3.5	29.85 .17	90.2 3.5	36.21 .00	52.9 0.4
16.4	13.91 .05	27.0 +0.1	52.05 .42	47.1 3.3	29.62 .28	93.6 3.3	36.20 -0.3	53.2 +0.2
26.4	13.85 -0.7	27.0 -0.1	51.56 -5.5	50.3 +2.9	29.29 -3.8	96.7 +3.0	36.15 -0.6	53.2 0.0
Nov. 5.4	13.77 .09	26.8 0.3	50.96 .66	53.0 2.5	28.86 .47	99.5 2.6	36.08 .08	53.1 -0.2
15.3	13.67 .10	26.5 0.4	50.25 .75	55.3 2.1	28.35 .55	101.9 2.1	36.00 .09	52.9 0.3
25.3	13.57 .11	26.0 0.5	49.45 .83	57.2 1.6	27.76 .62	103.8 1.6	35.90 .10	52.5 0.5
Dec. 5.3	13.45 .11	25.4 0.6	48.59 .88	58.5 1.0	27.12 .67	105.2 1.1	35.79 .11	51.9 0.6
15.3	13.34 -1.1	24.7 -0.7	47.69 -9.1	59.1 +0.4	26.43 -7.0	106.0 +0.5	35.68 -1.1	51.3 -0.7
25.2	13.23 .11	23.9 0.8	46.78 .91	59.2 -0.3	25.72 .71	106.2 -0.1	35.37 .11	50.5 0.8
35.2	13.12 -1.0	23.1 -0.9	45.87 -8.8	58.6 -0.9	25.01 -7.0	105.8 -0.7	35.45 -1.1	49.7 -0.8

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES,  
FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Cassiop.	$\alpha$ Androm.	$\sigma$ Androm.	$\epsilon$ Ceti.	$\delta$ Urs.Min., S. P.	$\gamma$ Piscium.	$\pi$ Androm.	$\theta$ Cassiop.
	$31^{\circ} 28'$ h m 0 3	$44^{\circ} 33'$ h m 0 4	$53^{\circ} 50'$ h m 0 12	$99^{\circ} 27'$ h m 0 13	$358^{\circ} 19'$ h m 0 13	$88^{\circ} 41'$ h m 0 19	$56^{\circ} 54'$ h m 0 30	$42^{\circ} 20'$ h m 0 38
Jan. 0.2	11.80 - .34	29.46 - .23	27.99 - .18	42.12 - .09	69.46 +7.73	38.78 - .14	53.40 - .20	28.77 - .24
10.2	11.47 .32	29.24 .21	27.82 .16	42.02 .10	77.19 7.61	38.65 .12	53.21 .17	28.53 .24
20.2	11.16 .30	29.04 .19	27.66 .15	41.91 .10	84.67 7.22	38.55 .10	53.06 .16	28.29 .23
30.2	10.88 - .27	28.85 - .18	27.51 - .14	41.82 - .09	91.64 +6.66	38.46 - .08	52.90 - .17	28.07 - .22
Aug. 26.6	16.02 + .24	33.08 + .17	31.37 + .18	45.30 + .16	33.98 -3.00	41.87 + .16	56.54 + .12	32.13 + .25
Sept. 5.5	16.22 .16	33.23 .13	31.53 .14	45.45 .13	31.48 9.00	42.02 .13	56.71 .16	32.35 .19
15.5	16.34 .09	33.34 .08	31.65 .09	45.57 .09	29.97 -0.98	42.14 .10	56.86 .12	32.51 .14
25.5	16.39 + .03	33.40 + .04	31.71 .05	45.65 .05	29.52 +0.09	42.21 .06	56.95 .07	32.63 .09
Oct. 5.5	16.40 - .02	33.42 .00	31.74 + .01	45.68 + .02	30.16 1.19	42.25 + .03	57.00 + .03	32.69 .05
15.4	16.35 - .08	33.39 - .05	31.74 - .02	45.67 - .01	31.90 +2.29	42.27 .00	57.02 .00	32.72 + .01
25.4	16.23 .14	33.32 .09	31.70 .08	45.65 .03	34.75 3.39	42.25 - .03	57.00 - .03	32.70 - .04
Nov. 4.4	16.06 .19	33.22 .12	31.63 .09	45.61 .06	38.68 4.43	42.21 .06	56.97 .06	32.63 .08
14.4	15.86 .23	33.08 .15	31.53 .12	45.53 .09	43.61 5.39	42.14 .08	56.88 .09	32.53 .12
24.3	15.61 .26	32.91 .17	31.40 .14	45.43 .10	49.45 6.22	42.05 .09	56.78 .11	32.40 .15
Dec. 4.3	15.34 - .29	32.73 - .19	31.26 - .15	45.33 - .10	56.06 +6.91	41.96 - .10	56.67 - .12	32.23 - .18
14.3	15.02 .32	32.53 .20	31.10 .16	45.23 .11	63.28 7.42	41.85 .11	56.53 .14	32.04 .20
24.2	14.70 .39	32.32 .21	30.93 .17	45.10 .12	70.90 7.71	41.75 .11	56.38 .16	31.83 .21
34.2	14.38 - .31	32.11 - .20	30.77 - .16	44.99 - .11	78.69 +7.77	41.64 - .10	56.21 - .18	31.61 - .22
Mean Solar Date.	$\delta$ Piscium.	$\gamma$ Cassiop.	$\mu$ Androm.	$\lambda$ Cephei.	$\kappa$ Tucane.	$\zeta$ Piscium.	$\kappa$ Octantis, S. P.	$\nu$ Androm.
	$83^{\circ} 1'$ h m 0 42	$29^{\circ} 53'$ h m 0 49	$52^{\circ} 6'$ h m 0 50	$4^{\circ} 21'$ h m 0 53	$159^{\circ} 28'$ h m 1 11	$86^{\circ} 59'$ h m 1 12	$184^{\circ} 47'$ h m 1 22	$49^{\circ} 9'$ h m 1 30
Jan. 0.3	51.57 - .11	57.12 - .34	31.83 - .18	38.97 -2.86	57.26 - .54	0.73 - .13	57.59 +2.75	13.40 - .18
10.2	51.46 .12	56.77 .35	31.65 .18	36.11 2.85	56.72 .54	0.60 .13	60.40 2.81	13.21 .20
20.2	51.33 .13	56.42 .34	31.47 .18	33.26 2.83	56.18 .53	0.47 .13	63.21 2.75	13.01 .22
30.2	51.21 - .12	56.09 - .32	31.29 - .18	30.46 -2.77	55.67 - .50	0.35 - .12	65.89 +2.56	12.78 - .24
Sept. 5.6	54.62 + .16	61.13 + .26	35.10 + .18	54.19 +1.44	61.44 + .40	3.52 + .19	52.44 -1.61	16.36 + .25
15.5	54.76 .12	61.36 .20	35.26 .14	55.43 1.04	61.79 .30	3.69 .15	51.05 1.17	16.59 .20
25.5	54.86 .08	61.52 .13	35.38 .10	56.27 .62	62.05 .20	3.81 .11	50.11 .72	16.77 .15
Oct. 5.5	54.92 .05	61.62 .07	35.47 .08	56.68 + .21	62.19 + .10	3.92 .07	49.61 - .25	16.90 .11
15.5	54.96 + .02	61.66 + .01	35.51 + .02	56.69 - .23	62.24 - .01	3.97 .04	49.62 + .26	17.00 .07
25.4	54.97 .00	61.64 - .05	35.52 - .01	56.22 - .67	62.17 - .12	4.00 + .02	50.14 + .76	17.05 + .04
Nov. 4.4	54.95 - .03	61.55 .11	35.49 .05	55.34 1.10	61.99 .22	4.01 - .01	51.13 1.24	17.08 + .01
14.4	54.91 .06	61.42 .17	35.42 .08	54.02 1.50	61.72 .31	3.98 .03	52.62 1.69	17.06 - .03
24.3	54.84 .08	61.21 .22	35.33 .11	52.33 1.89	61.36 .39	3.94 .05	54.50 2.07	17.01 .07
Dec. 4.3	54.75 .09	60.98 .25	35.21 .13	50.25 2.24	60.93 .45	3.88 .07	56.77 2.40	16.91 .10
14.3	54.66 - .10	60.71 - .30	35.07 - .15	47.85 -2.52	60.47 - .49	3.79 - .09	59.39 +2.62	16.81 - .13
24.2	54.54 .11	60.38 .33	34.91 .16	45.20 2.72	59.95 .59	3.69 .10	62.01 2.76	16.66 .16
34.2	54.43 - .10	60.05 - .34	34.75 - .16	42.40 -2.84	59.42 - .52	3.59 - .10	64.81 +2.80	16.49 - .18

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Mean Solar Date.	$\pi$ Piscium.	$\nu$ Piscium.	$\zeta$ Ceti.	$\gamma$ Androm.	$\beta$ Trianguli.	4 Urs. Min., S. P.	$\gamma$ Trianguli.	67 Ceti.
	78° 26' h m 1 31	85° 5' h m 1 35	100° 53' h m 1 45	48° 12' h m 1 57	55° 33' h m 2 2	348° 4' h m 2 9	56° 40' h m 2 10	96° 56' h m 2 11
Jan. 0.3	9.26 - .13	35.74 - .12	55.50 - .12	1.58 - .19	52.79 - .14	13.40 +1.06	39.40 - .12	23.53 - .10
10.3	9.13 .13	35.62 .12	55.38 .12	1.39 .19	52.64 .16	14.48 1.10	39.26 .16	23.42 .12
20.2	9.00 .13	35.50 .13	55.26 .13	1.20 .20	52.47 .18	15.61 1.14	39.09 .18	23.30 .14
30.2	8.86 .14	35.36 .13	55.11 .14	0.98 .21	52.28 .19	16.77 1.15	38.90 .19	23.15 .15
Feb. 9.2	8.73 .13	35.24 .12	54.97 .13	0.76 .20	52.09 .18	17.90 1.11	38.72 .18	23.00 .14
19.2	8.60 - .13	35.12 - .12	54.84 - .12	0.57 - .19	51.92 - .16	18.98 +1.05	38.54 - .17	22.86 - .13
Sept. 25.6	12.25 + .14	38.68 + .13	58.29 + .15	4.79 + .19	55.83 + .17	11.24 - .55	42.34 + .18	26.13 + .18
Oct. 5.5	12.37 .10	38.80 .10	58.43 .12	4.97 .15	55.99 .15	10.77 .39	42.51 .16	26.29 .14
15.5	12.45 .07	38.89 .07	58.52 .08	5.10 .11	56.13 .12	10.46 .23	42.66 .13	26.40 .11
25.5	12.50 + .04	38.94 + .04	58.59 + .05	5.20 + .07	56.23 + .08	10.31 - .06	42.78 + .10	26.50 + .08
Nov. 4.5	12.52 + .01	38.98 + .02	58.63 + .02	5.25 + .03	56.29 .04	10.34 + .13	42.85 .06	26.56 .04
14.5	12.53 - .01	38.98 - .01	58.63 - .01	5.27 .00	56.32 + .01	10.56 .31	42.90 + .03	26.58 + .01
24.4	12.50 .03	38.96 .04	58.61 .03	5.26 - .04	56.32 - .02	10.97 .49	42.90 - .01	26.59 - .01
Dec. 4.4	12.44 .06	38.90 .06	58.57 .06	5.19 .08	56.28 .05	11.54 .66	42.88 .05	26.56 .04
14.3	12.37 - .08	38.83 - .08	58.49 - .08	5.10 - .11	56.21 - .08	12.29 + .82	42.81 - .08	26.51 - .07
24.3	12.27 .10	38.73 .10	58.40 .10	4.97 .14	56.11 .12	13.18 .96	42.71 .11	26.42 .09
34.3	12.17 - .10	38.63 - .10	58.29 - .11	4.82 - .17	55.97 - .16	14.21 +1.10	42.58 - .14	26.33 - .09
Mean Solar Date.	$\delta$ Hydri.	$\delta$ Ceti.	$\mu$ Hydri.	$\theta$ Persei.	$\sigma$ Arietis.	47 Cephei.	$\epsilon$ Arietis.	$\beta$ Persei. (Algol.)
	159° 10' h m 2 19	90° 9' h m 2 33	169° 36' h m 2 33	41° 15' h m 2 36	75° 23' h m 2 45	11° 2' h m 2 51	69° 6' h m 2 52	49° 29' h m 3 0
Jan. 0.3	45.94 - .53	44.40 - .09	65.50 -1.12	33.53 - .18	18.56 - .10	17.04 - .76	48.56 - .09	53.26 - .10
10.3	45.40 .55	44.30 .11	64.35 1.18	33.34 .21	18.45 .12	16.22 .88	48.46 .11	53.14 .14
20.3	44.84 .56	44.18 .13	63.14 1.22	33.12 .23	18.32 .13	15.28 .99	48.34 .13	52.97 .19
30.3	44.27 .57	44.04 .14	61.91 1.22	32.87 .25	18.19 .15	14.25 1.05	48.19 .15	52.76 .21
Feb. 9.2	43.71 .56	43.89 .15	60.70 1.19	32.62 .26	18.03 .16	13.19 1.08	48.03 .16	52.55 .22
19.2	43.15 - .55	43.73 - .16	59.52 -1.16	32.36 - .26	17.87 - .15	12.10 -1.09	47.86 - .17	52.33 - .21
Sept. 25.6	48.46 + .36	46.85 + .19	67.54 + .70	36.62 + .28	21.03 + .21	22.69 + .89	51.04 + .20	55.96 + .26
Oct. 5.6	48.77 .26	47.02 .16	68.16 .53	36.88 .24	21.22 .17	23.51 .75	51.23 .18	56.21 .23
15.6	48.99 .16	47.16 .13	68.59 .32	37.10 .19	21.37 .14	24.19 .61	51.40 .17	56.43 .20
25.5	49.10 + .06	47.28 + .11	68.80 + .09	37.26 + .14	21.51 + .12	24.72 + .46	51.57 + .14	56.61 + .16
Nov. 4.5	49.11 - .05	47.38 .07	68.77 - .14	37.39 .10	21.62 .09	25.11 .27	51.69 .10	56.76 .12
14.5	49.00 .16	47.42 .03	68.52 .36	37.46 .05	21.69 .06	25.29 + .08	51.77 .06	56.86 .08
24.4	48.78 .26	47.45 + .01	68.05 .56	37.50 + .01	21.74 + .03	25.28 - .09	51.82 + .03	56.93 + .04
Dec. 4.4	48.48 .35	47.44 - .02	67.40 .74	37.48 - .04	21.74 .00	25.08 .31	51.84 .00	56.95 .00
14.4	48.09 - .42	47.40 - .05	66.57 - .91	37.41 - .09	21.73 - .03	24.68 - .49	51.83 - .03	56.93 - .04
24.4	47.64 .48	47.34 .07	65.59 1.03	37.29 .14	21.68 .07	24.10 .66	51.78 .06	56.6 .06
34.3	47.13 - .53	47.26 - .09	64.51 -1.12	37.13 - .19	21.59 - .11	23.37 - .60	51.70 - .10	56.76 - .11

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Mean Solar Date.	$\rho$ Octantis. S. P.	$\iota$ Hydri.	$f$ Tauri.	$\gamma$ Camelop.	$\gamma$ Hydri.	$\epsilon$ Persei.	$\alpha^1$ Tauri.	$\epsilon$ Persei.
	185° 55'	167° 48'	77° 27'	19° 1'	164° 35'	50° 19'	68° 14'	42° 35'
	h m 3 17	h m 3 18	h m 3 24	h m 3 38	h m 3 48	h m 3 50	h m 3 58	h m 4 0
Jan. 0.4	25.92 +2.11	49.08 - .87	41.51 - .06	34.78 - .32	62.02 - .61	20.78 - .08	4.79 - .02	32.60 - .08
10.3	28.11 2.26	48.17 .95	41.43 .09	34.41 .42	61.37 .69	20.68 .12	4.74 .07	32.50 .12
20.3	30.44 2.39	47.18 1.02	41.32 .12	33.95 .49	60.64 .77	20.55 .15	4.63 .12	32.35 .17
30.3	32.86 2.44	46.12 1.06	41.18 .14	33.43 .56	59.82 .83	20.37 .19	4.50 .15	32.15 .21
Feb. 9.3	35.32 2.44	45.05 1.07	41.03 .16	32.83 .60	58.97 .87	20.17 .21	4.34 .17	31.92 .24
19.2	37.77 +2.39	43.98 -1.06	40.86 - .17	32.22 - .62	58.08 - .88	19.95 - .22	4.17 - .19	31.67 - .27
29.2	40.10 +2.26	42.93 -1.02	40.69 - .17	31.60 - .61	57.20 - .86	19.72 - .22	3.97 - .20	31.39 - .29
Oct. 5.6	32.14 -1.10	49.37 + .65	43.87 + .24	38.76 + .60	61.38 + .60	23.35 + .28	7.03 + .25	35.25 + .32
15.6	31.19 .77	49.93 .46	44.08 .18	39.32 .52	61.92 .48	23.62 .25	7.27 .23	35.56 .30
25.5	30.60 - .38	50.30 + .27	44.23 + .15	39.80 + .44	62.33 + .35	23.86 + .23	7.49 + .20	35.85 + .27
Nov. 4.5	30.44 + .06	50.48 + .08	44.37 .13	40.19 .34	62.61 .20	24.08 .19	7.67 .17	36.09 .23
14.5	30.72 .48	50.47 - .10	44.50 .10	40.48 .24	62.73 + .05	24.24 .15	7.83 .14	36.30 .18
24.5	31.40 .88	50.28 .28	44.57 .06	40.66 .12	62.71 - .08	24.38 .11	7.95 .10	36.45 .13
Dec. 4.4	32.49 1.29	49.90 .46	44.62 + .03	40.72 + .01	62.56 .23	24.46 .06	8.04 .06	36.56 .08
14.4	33.97 +1.64	49.35 - .62	44.63 .00	40.68 - .10	62.25 - .39	24.51 + .02	8.08 + .03	36.61 + .02
24.4	35.76 1.94	48.65 .77	44.62 - .04	40.51 .23	61.78 .52	24.50 - .03	8.10 - .01	36.60 - .03
34.4	37.82 +2.18	47.81 - .91	44.55 - .09	40.22 - .35	61.21 - .62	24.44 - .09	8.07 - .05	36.55 - .08
Mean Solar Date.	$\alpha^1$ Eridani.	$\eta$ Urs.Min. S. P.	$m$ Persei.	$\delta$ Mensæ.	$\tau$ Tauri.	$i$ Tauri.	$\zeta$ Aurigæ.	$\rho$ Eridani.
	97° 8'	346° 1'	47° 11'	170° 28'	67° 16'	71° 21'	49° 5'	95° 14'
	h m 4 6	h m 4 20	h m 4 25	h m 4 25	h m 4 35	h m 4 44	h m 4 54	h m 5 2
Jan. 0.4	24.21 - .03	42.17 + .47	32.79 - .04	41.30 - .80	31.80 .00	49.76 .00	39.64 + .03	21.12 .07
10.4	24.16 .08	42.72 .63	32.73 .08	40.32 1.06	31.77 - .05	49.74 - .04	39.63 - .04	21.10 - .04
20.4	24.05 .11	43.43 .77	32.62 .14	39.17 1.22	31.69 .10	49.69 .08	39.55 .11	21.04 .08
30.3	23.94 .14	44.26 .85	32.45 .18	37.88 1.34	31.57 .13	49.58 .13	39.42 .16	20.94 .11
Feb. 9.3	23.78 .16	45.14 .92	32.26 .21	36.50 1.42	31.43 .16	49.44 .15	39.24 .20	20.82 .14
19.3	23.63 - .17	46.10 + .96	32.03 - .24	35.05 -1.46	31.26 - .18	49.28 - .17	39.03 - .22	20.66 - .17
29.2	23.44 .19	47.07 .95	31.79 .24	33.58 1.46	31.06 .19	49.09 .19	38.80 .23	20.49 .19
Mar. 10.2	23.23 - .20	48.01 + .92	31.55 - .23	32.13 -1.42	30.88 - .16	48.90 - .18	38.56 - .24	20.29 - .20
Oct. 15.6	26.26 + .21	41.81 - .73	35.47 + .30	37.65 + .89	34.06 + .28	51.90 + .26	42.07 + .33	22.79 + .22
25.6	26.46 + .18	41.15 - .59	35.76 + .27	38.44 + .69	34.32 + .24	52.15 + .24	42.39 + .30	23.02 + .23
Nov. 4.6	26.63 .15	40.63 .45	36.02 .24	39.03 .47	34.54 .21	52.38 .22	42.68 .27	23.25 .21
14.5	26.77 .13	40.26 .29	36.24 .20	39.38 + .23	34.74 .18	52.59 .18	42.94 .24	23.43 .18
24.5	26.89 .10	40.05 - .13	36.42 .16	39.49 - .02	34.89 .14	52.74 .15	43.16 .19	23.60 .15
Dec. 4.5	26.96 .05	40.01 + .05	36.56 .11	39.33 .28	35.03 .10	52.88 .12	43.32 .15	23.74 .11
14.5	26.99 + .02	40.15 + .22	36.64 + .05	38.94 - .52	35.10 + .06	52.98 + .08	43.46 + .10	23.83 + .07
24.4	27.00 - .01	40.46 .40	36.67 + .01	38.30 .76	35.15 + .02	53.03 + .03	43.52 + .04	23.88 + .03
34.4	26.97 - .04	40.95 + .56	36.66 - .03	37.43 - .98	35.15 - .02	53.04 - .01	43.54 .00	23.90 .00

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Mean Solar Date.	$\tau$ Orionis.	$\chi$ Aurigæ.	Groombr. 944.	$\kappa$ Orionis.	$\nu$ Aurigæ.	$\delta$ Doradus.	$\beta$ Aurigæ.	$\theta$ Aurigæ.
	96° 58' h m 5 12	57° 53' h m 5 25	4° 52' h m 5 26	99° 43' h m 5 42	50° 53' h m 5 43	155° 47' h m 5 44	45° 4' h m 5 51	52° 48' h m 5 52
Jan. 0.4	10.61 + .01	26.91 + .06	22.33 - .30	27.26 + .05	44.29 + .07	37.67 - .15	19.60 + .08	5.73 + .08
10.4	10.60 - .02	26.97 .00	21.80 .76	27.29 .00	44.33 + .01	37.48 .23	19.65 + .01	5.78 + .02
20.4	10.56 .07	26.94 - .06	20.80 1.23	27.25 - .05	44.31 - .05	37.20 .32	19.63 - .06	5.77 - .04
30.4	10.46 .11	26.85 .11	19.34 1.61	27.18 .09	44.22 .10	36.83 .40	19.54 .11	5.69 .09
Feb. 9.3	10.33 .14	26.72 .15	17.48 2.00	27.06 .13	44.10 .15	36.40 .47	19.41 .16	5.59 .13
19.3	10.18 - .16	26.54 - .18	15.34 -2.30	26.91 - .16	43.92 - .19	35.90 - .52	19.21 - .20	5.43 - .18
29.3	10.01 .18	26.36 .20	12.99 2.41	26.74 .18	43.71 .22	35.37 .55	19.00 .23	5.22 .21
Mar. 10.3	9.81 .20	26.15 .21	10.53 2.46	26.55 .19	43.48 .23	34.79 .58	18.75 .26	5.00 .22
20.2	9.62 - .18	25.93 - .21	8.06 -2.46	26.36 - .18	43.26 - .21	34.22 - .56	18.48 - .28	4.78 - .21
Oct. 25.6	12.43 + .24	29.34 + .29	31.06 +2.56	28.86 + .26	46.68 + .34	26.54 + .45	22.05 + .39	8.04 + .32
Nov. 4.6	12.66 .22	29.62 .27	33.45 2.22	29.11 .24	47.01 .32	36.96 .40	22.42 .35	8.36 .31
14.6	12.87 .19	29.88 .24	35.50 1.69	29.33 .21	47.32 .29	37.34 .33	22.75 .32	8.67 .29
24.5	13.03 .16	30.11 .22	37.22 1.51	29.54 .18	47.58 .25	37.61 .23	23.06 .28	8.93 .26
Dec. 4.5	13.18 .12	30.32 .18	38.51 1.05	29.69 .14	47.82 .20	37.80 .14	23.31 .23	9.18 .22
14.5	13.28 + .08	30.46 + .13	39.32 + .56	29.83 + .11	47.99 + .15	37.88 + .04	23.52 + .17	9.37 + .16
24.5	13.33 + .03	30.57 .08	39.62 + .05	29.91 .06	48.13 .10	37.87 - .07	23.66 .12	9.50 .11
34.4	13.36 - .01	30.62 + .02	39.42 - .45	29.95 + .02	48.20 + .05	37.74 - .18	23.76 + .08	9.59 + .06
Mean Solar Date.	$\gamma$ Geminor.	$\psi$ Aurigæ.	$\nu$ Geminor.	$\chi$ Draconis, S. P.	$\epsilon$ Geminor.	$\psi^b$ Aurigæ.	$\theta$ Geminor.	$\zeta$ Mensæ.
	67° 28' h m 6 8	40° 39' h m 6 16	69° 43' h m 6 22	342° 41' h m 6 22	64° 46' h m 6 37	46° 19' h m 6 38	55° 54' h m 6 45	170° 42' h m 6 49
Jan. 0.5	7.59 + .08	17.23 + .13	19.30 + .09	60.37 + .04	3.00 + .13	40.64 + .16	25.03 + .15	31.57 - .19
10.5	7.65 + .03	17.32 + .05	19.37 + .04	60.47 .17	3.10 .08	40.76 .08	25.15 .09	31.27 .41
20.4	7.66 - .02	17.33 - .03	19.39 - .01	60.70 .31	3.13 + .01	40.79 + .01	25.20 + .02	30.74 .65
30.4	7.61 .07	17.26 .10	19.36 .05	61.09 .43	3.12 - .04	40.77 - .05	25.20 - .04	29.97 .88
Feb. 9.4	7.51 .11	17.14 .15	19.29 .10	61.57 .53	3.05 .09	40.69 .11	25.13 .09	28.92 1.08
19.4	7.40 - .14	16.97 - .20	19.17 - .14	62.15 + .64	2.94 - .13	40.55 - .17	25.02 - .14	27.81 -1.24
29.3	7.24 .17	16.74 .25	19.02 .16	62.84 .71	2.80 .16	40.35 .21	24.86 .18	26.51 1.37
Mar. 10.3	7.06 .19	16.47 .28	18.85 .18	63.58 .74	2.62 .18	40.13 .23	24.67 .20	25.08 1.46
20.3	6.86 .20	16.19 .29	18.65 .20	64.33 .76	2.43 .19	39.90 .25	24.46 .21	23.59 1.50
30.3	6.67 .19	15.90 .28	18.46 .18	65.10 .76	2.23 .20	39.64 .28	24.25 .22	22.07 1.52
Apr. 9.2	6.49 - .18	15.63 - .28	18.29 - .16	65.86 + .75	2.04 - .19	39.39 - .25	24.02 - .22	20.54 -1.52
Nov. 14.6	10.13 + .28	20.40 + .36	21.72 + .29	60.61 - .57	5.47 + .29	43.50 + .37	27.65 + .34	24.72 + .27
24.6	10.39 .24	20.75 .33	21.99 .25	60.10 .45	5.75 .26	43.85 .33	27.97 .30	25.58 .75
Dec. 4.6	10.61 .20	21.07 .28	22.22 .21	59.71 .33	6.00 .24	44.16 .28	28.24 .26	26.22 .52
14.5	10.79 + .16	21.31 + .21	22.42 + .17	59.44 - .21	6.23 + .20	44.42 + .25	28.49 + .22	26.62 + .27
24.5	10.93 .12	21.50 .16	22.57 .13	59.30 - .08	6.39 .15	44.64 .19	28.69 .18	26.76 .00
34.5	11.03 + .08	21.64 + .12	22.68 + .09	59.33 + .11	6.53 + .11	44.79 + .12	28.84 + .13	26.63 - .26

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Mean Solar Date.	ζ Geminor.	63 Aurigæ.	25 Camelop.	γ <sup>a</sup> Volantis.	β Can. Min.	26 Lynceæ.	Groombr. 1374.	ε <sup>1</sup> Cancri.
	69° 16' h m 6 57	50° 30' h m 7 3	7° 23' h m 7 7	160° 19' h m 7 9	81° 29' h m 7 21	42° 9' h m 7 46	15° 47' h m 7 46	64° 18' h m 7 54
Jan. 0.5	28.51 + .14	57.71 + .15	34.97 + .64	46.06 + .06	5.13 + .16	33.93 + .36	48.66 + .54	9.68 + .19
10.5	28.63 .09	57.84 .10	35.46 + .29	46.05 - .06	5.26 .10	34.15 .18	49.08 .31	9.85 .15
20.5	28.68 + .03	57.92 + .05	35.56 - .05	45.90 .31	5.33 + .05	34.28 .10	49.29 + .14	9.96 .10
30.4	28.69 - .08	57.93 - .01	35.35 .39	45.64 .39	5.36 .00	34.35 + .03	49.36 - .01	10.04 + .04
Feb. 9.4	28.65 .07	57.87 .07	34.77 .79	45.25 .49	5.33 - .05	34.35 - .04	49.27 .18	10.05 - .09
19.4	28.56 - .12	57.78 - .12	33.91 -1.00	44.79 - .51	5.25 - .09	34.27 - .11	48.99 - .34	10.01 - .06
29.4	28.42 .15	57.62 .18	32.77 1.23	44.23 .60	5.15 .12	34.13 .16	48.59 .46	9.92 .10
Mar. 10.3	28.27 .17	57.42 .21	31.44 1.41	43.60 .65	5.01 .15	33.94 .39	48.07 .56	9.80 .14
20.3	28.09 .19	57.21 .22	29.97 1.52	42.93 .68	4.85 .17	33.72 .24	47.46 .65	9.63 .16
30.3	27.89 .19	56.98 .33	28.41 1.56	42.24 .70	4.67 .18	33.47 .25	46.77 .70	9.46 .18
Apr. 9.2	27.71 - .18	56.75 - .22	26.82 -1.56	41.54 - .68	4.50 - .17	33.21 - .26	46.06 - .71	9.27 - .19
19.2	27.53 - .17	56.54 - .20	25.29 -1.52	40.87 - .65	4.33 - .16	32.95 - .25	45.35 - .68	9.09 - .18
Nov. 24.6	31.10 + .27	60.69 + .33	43.24 +1.65	44.48 + .46	7.42 + .26	36.92 + .42	53.03 + .21	12.15 + .34
Dec. 4.6	31.36 .24	61.00 .29	44.78 1.42	44.89 .26	7.67 .25	37.32 .26	53.86 .21	12.47 .30
14.6	31.59 + .20	61.28 + .25	46.09 +1.16	45.20 + .25	7.91 + .28	37.67 + .33	54.65 + .71	12.74 + .27
24.5	31.77 .16	61.51 .20	47.09 .25	45.39 .13	8.11 .18	37.99 .29	55.29 .58	13.00 .24
34.5	31.92 + .13	61.60 + .14	47.78 + .54	45.45 + .02	8.26 + .14	38.25 + .25	55.80 + .45	13.22 + .20
Mean Solar Date.	ζ <sup>1</sup> Cancri.	β Cancri.	30 Mono- cerotis.	θ Chamæ- leontis.	ε Hydræ.	γ Cancri.	σ <sup>a</sup> Cancri. (mean.)	θ Hydræ.
	72° 1' h m 8 5	80° 28' h m 8 10	93° 32' h m 8 20	167° 7' h m 8 23	86° 16' h m 8 32	68° 8' h m 8 36	59° 0' h m 8 47	87° 13' h m 9 8
Jan. 0.6	47.69 + .17	26.87 + .17	4.32 + .17	66.05 + .30	54.69 + .18	48.55 + .23	24.88 + .25	32.54 + .24
10.6	47.85 .15	27.03 .15	4.48 .14	66.27 + .14	54.86 .16	48.76 .18	25.11 .21	32.76 .20
20.5	47.99 .11	27.15 .10	4.61 .10	66.34 - .03	55.02 .12	48.92 .13	25.30 .15	32.93 .15
30.5	48.06 + .05	27.23 + .05	4.67 + .05	66.20 .21	55.10 .07	49.03 .08	25.42 .10	33.05 .10
Feb. 9.5	48.09 .00	27.26 .00	4.70 .00	65.91 .38	55.15 + .02	49.08 + .03	25.49 + .04	33.13 + .05
19.4	48.06 - .05	27.23 - .05	4.88 - .05	65.44 - .56	55.14 - .03	49.08 - .02	25.51 - .01	33.16 .00
29.4	47.98 .10	27.16 .09	4.61 .09	64.79 .71	55.08 .08	49.04 .07	25.46 .07	33.14 - .04
Mar. 10.4	47.86 .13	27.05 .12	4.50 .12	64.03 .81	54.99 .11	48.94 .11	25.37 .11	33.07 .08
20.4	47.73 .15	26.91 .15	4.38 .14	63.18 .90	54.88 .13	48.82 .14	25.25 .14	32.98 .11
30.3	47.56 .17	26.76 .16	4.22 .16	62.24 .96	54.73 .15	48.67 .16	25.09 .17	32.86 .13
Apr. 9.3	47.38 - .17	26.60 - .17	4.05 - .17	61.26 -1.00	54.57 - .16	48.51 - .17	24.91 - .18	32.72 - .14
19.3	47.22 .16	26.43 .17	3.88 .16	60.24 1.02	54.41 .16	48.34 .17	24.73 .18	32.58 .15
29.2	47.06 .16	26.26 .15	3.72 .16	59.21 1.02	54.25 .15	48.17 .16	24.56 .17	32.43 .15
May 9.2	46.91 - .15	26.12 - .12	3.56 - .15	58.20 -1.00	54.11 - .13	48.02 - .14	24.40 - .15	32.28 - .14

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Mean Solar Date.	$\beta$ Argus.	$\alpha$ Lyncis.	10 Leonis Minoris.	$\epsilon$ Leonis.	$\zeta$ Chamæ- leontis.	19 Leonis Minoris.	$\pi$ Leonis.	$\lambda$ Ursæ Majoris.
	159° 15' h m 9 11	55° 8' h m 9 14	53° 4' h m 9 27	79° 36' h m 9 35	170° 26' h m 9 37	48° 25' h m 9 50	81° 25' h m 9 54	46° 32' h m 10 10
Jan. 0.6	61.76 + .39	13.94 + .37	21.75 + .30	10.49 + .25	17.82 + .83	49.36 + .36	17.73 + .36	20.23 + .36
10.6	62.09 .26	14.20 .34	22.03 .26	10.73 .29	18.54 .61	49.69 .30	17.98 .34	20.59 .34
20.6	62.20 .15	14.43 .30	22.28 .22	10.94 .18	19.04 .38	49.97 .25	18.21 .30	20.91 .28
30.6	62.39 + .04	14.59 .14	22.46 .15	11.09 .13	19.29 + .13	50.19 .18	18.39 .15	21.14 .21
Feb. 9.5	62.37 - .08	14.70 .07	22.58 .09	11.21 .08	19.31 - .10	50.34 .12	18.51 .10	21.34 .15
19.5	62.22 - .20	14.73 + .01	22.64 + .03	11.25 + .03	19.09 - .22	50.43 + .06	18.57 + .05	21.45 + .08
29.5	61.98 .30	14.73 - .04	22.64 - .02	11.27 - .01	18.67 .53	50.46 .00	18.61 + .01	21.50 + .02
Mar. 10.4	61.63 .29	14.65 .09	22.60 .08	11.23 .06	18.03 .79	50.44 - .05	18.59 - .04	21.50 - .03
20.4	61.21 .45	14.55 .12	22.48 .12	11.15 .09	17.22 .89	50.35 .11	18.53 .07	21.44 .09
30.4	60.73 .53	14.40 .15	22.35 .15	11.05 .11	16.26 1.03	50.22 .14	18.44 .10	21.33 .13
Apr. 9.3	60.18 - .55	14.24 - .17	22.19 - .17	10.92 - .13	15.16 -1.15	50.67 - .17	18.33 - .12	21.17 - .16
19.3	59.62 .57	14.05 .19	22.00 .19	10.79 .14	13.97 1.23	49.88 .19	18.20 .13	20.99 .19
29.3	59.04 .58	13.86 .18	21.81 .18	10.64 .15	12.71 1.28	49.68 .20	18.07 .14	20.79 .20
May 9.3	58.45 .59	13.69 .17	21.64 .17	10.50 .14	11.42 1.31	49.49 .19	17.93 .13	20.59 .19
19.2	57.87 - .58	13.53 - .15	21.47 - .16	10.37 - .13	10.09 -1.24	49.30 - .18	17.80 - .12	20.40 - .15
Mean Solar Date.	$\mu$ Hydræ.	$\beta$ Leonis Minoris.	$\alpha$ Antilæ.	$\beta$ Octantis, S. P.	41 Leonis Minoris.	$\delta$ Chamæ- leontis.	46 Leonis Minoris.	Groombr. 1706.
	106° 16' h m 10 20	52° 43' h m 10 21	120° 30' h m 10 22	188° 2' h m 10 34	66° 14' h m 10 37	169° 57' h m 10 44	55° 11' h m 10 47	11° 36' h m 10 50
Jan. 20.7	41.23 + .18	24.76 + .28	2.55 + .21	22.24 - .68	19.87 + .26	51.34 + .76	3.12 + .28	60.29 + .28
30.6	41.40 .15	25.01 .21	2.74 .16	21.70 .41	20.10 .20	51.99 .54	3.38 .22	61.14 .77
Feb. 9.6	41.54 .11	25.19 .15	2.88 .12	21.42 - .16	20.27 .15	52.43 .33	3.59 .18	61.83 .56
19.5	41.63 .06	25.31 .10	2.97 .07	21.38 + .08	20.41 .11	52.65 + .12	3.73 .12	62.30 .36
29.5	41.65 + .01	25.38 + .04	3.01 + .01	21.58 .31	20.48 + .06	52.68 - .08	3.84 + .06	62.56 + .16
Mar. 10.5	41.65 - .03	25.38 - .01	2.99 - .04	21.99 + .54	20.51 .00	52.49 - .29	3.86 + .01	62.62 - .05
20.4	41.60 .08	25.35 .06	2.94 .08	22.66 .78	20.49 - .04	52.11 .47	3.86 - .04	62.46 .26
30.4	41.50 .10	25.25 .11	2.84 .11	23.54 .99	20.43 .07	51.55 .65	3.79 .08	62.10 .45
Apr. 9.4	41.39 .11	25.13 .14	2.72 .13	24.63 1.17	20.34 .09	50.83 .79	3.70 .11	61.57 .26
19.4	41.27 .12	24.96 .16	2.59 .15	25.88 1.33	20.24 .11	49.98 .91	3.58 .13	60.92 .72
29.3	41.15 - .13	24.82 - .17	2.43 - .16	27.28 +1.46	20.11 - .13	49.02 -1.01	3.44 - .15	60.14 - .28
May 9.3	41.01 .14	24.65 .18	2.27 .16	28.79 1.57	19.97 .14	47.96 1.08	3.29 .16	59.29 .28
19.3	40.87 .13	24.46 .17	2.11 .17	30.41 1.68	19.83 .14	46.86 1.13	3.13 .16	58.39 .28
29.3	40.74 .13	24.31 .15	1.94 .15	32.10 1.69	19.70 .13	45.70 1.18	2.97 .15	57.48 .28
June 8.2	40.61 - .12	24.16 - .13	1.80 - .13	33.79 +1.66	19.58 - .11	44.51 -1.18	2.83 - .13	56.60 - .28

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES,  
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Mean Solar Date.	$\gamma$ Octantis.	$\rho^3$ Leonis.	$\psi$ Urs. Maj.	$\nu$ Urs. Maj.	$\xi$ Hydræ.	$\chi$ Urs. Maj.	$\pi$ Virginis.	$\epsilon$ Corvi.
	173° 59' h m 11 0	87° 26' h m 11 1	44° 54' h m 11 3	56° 18' h m 11 12	121° 14' h m 11 27	41° 36' h m 11 40	82° 46' h m 11 55	112° 0' h m 12 4
Feb. 9.6	19.97 + .85	12.17 + .14	22.68 + .21	26.52 + .20	30.71 + .17	8.82 + .28	8.54 + .23	22.65 + .22
19.6	20.45 + .31	12.30 .11	22.87 .16	26.70 .15	30.87 .14	9.07 .22	8.74 .17	22.85 .17
29.5	20.59 - .02	12.40 .07	23.01 .10	26.83 .10	31.00 .10	9.25 .15	8.88 .12	23.00 .13
Mar. 10.5	20.41 .25	12.44 + .02	23.07 + .03	26.89 + .04	31.06 + .04	9.37 .08	8.99 .08	23.11 .09
20.5	19.89 .66	12.45 - .01	23.07 - .02	26.91 .00	31.08 .00	9.41 + .02	9.04 .04	23.17 .05
30.5	19.10 - .94	12.41 - .04	23.02 - .07	26.88 - .05	31.07 - .03	9.41 - .04	9.08 + .01	23.19 + .02
Apr. 9.4	18.01 1.21	12.37 .06	22.92 .11	26.81 .08	31.02 .07	9.34 .09	9.07 - .02	23.21 .00
19.4	16.69 1.44	12.28 .09	22.80 .14	26.72 .10	30.93 .09	9.24 .12	9.04 .05	23.18 - .04
29.4	15.14 1.64	12.18 .10	22.63 .17	26.60 .13	30.83 .11	9.09 .16	8.97 .07	23.13 .07
May 9.3	13.42 1.79	12.08 .11	22.45 .18	26.46 .15	30.71 .13	8.92 .18	8.89 .08	23.04 .10
19.3	11.57 -1.90	11.96 - .12	22.26 - .20	26.31 - .14	30.57 - .14	8.73 - .20	8.80 - .09	22.94 - .11
29.3	9.63 1.98	11.85 .11	22.05 .20	26.17 .15	30.43 .15	8.53 .21	8.71 .10	22.84 .11
June 8.3	7.62 2.00	11.73 .10	21.86 .18	26.01 .15	30.27 .15	8.31 .21	8.59 .11	22.72 .12
18.2	5.64 -1.96	11.63 - .09	21.65 - .17	25.87 - .14	30.13 - .14	8.11 - .19	8.49 - .10	22.61 - .11
Mean Solar Date.	2 Can. Ven.	6 Urs. Min.	$\delta^3$ Corvi.	$\beta$ Can. Ven.	$\gamma$ Virginis, (mean.)	31 Cor. Bor.	$\gamma$ Cassiop., S. P.	43 Cephei, S. P.
	48° 43' h m 12 10	1° 41' h m 12 14	105° 53' h m 12 24	48° 2' h m 12 28	90° 50' h m 12 35	61° 51' h m 12 46	330° 7' h m 12 49	355° 39' h m 12 53
Feb. 9.6	31.29 + .27	38.08 +5.69	4.89 + .23	25.83 + .29	59.56 + .26	14.97 + .26	55.77 - .31	28.19 -2.49
19.6	31.54 .23	43.22 4.54	5.10 .19	26.10 .25	59.79 .20	15.22 .23	55.49 .26	28.90 2.11
29.6	31.75 .17	47.16 3.29	5.27 .15	26.33 .20	59.96 .15	15.44 .19	55.27 .19	23.99 1.68
Mar. 10.5	31.89 .11	49.80 1.94	5.40 .11	26.49 .14	60.09 .11	15.60 .14	55.12 .11	22.54 1.20
20.5	31.97 .08	51.03 + .22	5.50 .07	26.60 .08	60.19 .08	15.73 .10	55.04 - .04	21.58 .09
30.5	32.01 + .02	50.85 - .28	5.54 + .04	26.66 + .03	60.26 + .05	15.80 + .05	55.03 + .04	21.15 - .09
Apr. 9.5	32.01 - .03	49.31 2.17	5.57 + .01	26.67 - .01	60.29 + .02	15.84 + .02	55.12 .13	21.40 + .49
19.4	31.95 .07	46.51 3.37	5.56 - .02	26.64 .05	60.29 - .01	15.84 - .01	55.29 .21	22.12 .29
29.4	31.87 .10	42.57 4.43	5.53 .04	26.56 .10	60.27 .03	15.81 .05	55.53 .29	23.38 1.42
May 9.4	31.75 .13	37.65 5.33	5.48 .07	26.45 .12	60.23 .05	15.74 .07	55.86 .26	25.07 1.89
19.4	31.61 - .15	31.92 -6.01	5.40 - .09	26.32 - .14	60.16 - .07	15.67 - .09	56.25 + .41	27.15 +2.24
29.3	31.46 .16	25.63 6.23	5.30 .10	26.17 .16	60.08 .08	15.56 .10	56.68 .45	29.55 2.22
June 8.3	31.29 .17	18.86 6.81	5.20 .10	26.00 .17	60.00 .10	15.45 .11	57.15 .50	32.18 2.71
18.3	31.12 - .16	12.02 -7.01	5.10 - .09	25.82 - .18	59.89 - .10	15.33 - .11	57.68 + .26	34.97 +2.24



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Mean Solar Date.	$\delta$ Muscæ.	$\epsilon$ Virginis.	$\gamma$ Can. Ven.	$\kappa$ Octantis.	B.A.C. 4536.	$\eta$ Virginis.	$\theta$ Apodis.	$\pi$ Hydræ.
	$160^{\circ} 57'$ h m 12 54	$78^{\circ} 26'$ h m 12 56	$48^{\circ} 50'$ h m 13 12	$175^{\circ} 13'$ h m 13 23	$52^{\circ} 15'$ h m 13 29	$98^{\circ} 8'$ h m 13 35	$166^{\circ} 15'$ h m 13 54	$116^{\circ} 9'$ h m 14 0
Feb. 29.6	38.71 + .41	36.85 + .16	31.97 + .94	12.64 +1.75	48.38 + .98	44.71 + .91	30.72 + .78	0.36 + .92
Mar. 10.6	39.07 .31	37.00 .14	32.19 .20	14.24 1.43	48.62 .90	44.90 .17	31.44 .06	0.58 .21
20.6	39.33 .21	37.14 .11	32.36 .14	15.49 1.05	48.79 .15	45.05 .14	32.04 .54	0.79 .18
30.5	39.50 .12	37.22 .07	32.47 .09	16.34 .66	48.92 .11	45.18 .12	32.51 .41	0.94 .14
Apr. 9.5	39.56 + .02	37.27 .04	32.54 .05	16.82 + .99	49.00 .07	45.29 .08	32.86 .98	1.08 .12
19.5	39.54 - .07	37.30 + .01	32.56 + .01	16.92 - .10	49.05 + .02	45.34 + .04	33.07 + .14	1.18 + .08
29.5	39.42 .16	37.28 - .02	32.55 - .04	16.61 .49	49.06 - .01	45.38 + .02	33.15 + .01	1.25 .05
May 9.4	39.22 .94	37.26 .05	32.48 .08	15.94 .87	49.03 .05	45.39 .00	33.09 - .12	1.28 + .02
19.4	38.93 .32	37.19 .07	32.38 .11	14.88 1.20	48.96 .09	45.38 - .02	32.92 .34	1.29 .00
29.4	38.59 .38	37.12 .08	32.27 .13	13.54 1.50	48.86 .11	45.34 .05	32.61 .36	1.28 - .03
June 8.4	38.17 - .45	37.03 - .09	32.13 - .15	11.87 -1.80	48.74 - .13	45.28 - .07	32.20 - .48	1.24 - .06
18.3	37.70 .80	36.94 .10	31.97 .17	9.94 2.04	48.61 .14	45.21 .08	31.66 .58	1.15 .09
28.3	37.18 .51	36.82 .11	31.79 .18	7.80 2.22	48.46 .16	45.12 .10	31.05 .88	1.06 .11
July 8.3	36.68 - .48	36.71 - .10	31.61 - .17	5.48 -2.40	48.28 - .18	45.01 - .12	30.35 - .74	0.94 - .13
Mean Solar Date.	$\delta$ Bootis.	$\kappa$ Virginis.	$\delta$ Octantis.	4 Ura. Min.	$\lambda$ Bootis.	$\lambda$ Virginis.	$\alpha$ Apodis.	$\mu$ Hydri, S. P.
	$64^{\circ} 23'$ h m 14 5	$99^{\circ} 45'$ h m 14 6	$173^{\circ} 9'$ h m 14 9	$11^{\circ} 56'$ h m 14 9	$43^{\circ} 24'$ h m 14 12	$102^{\circ} 51'$ h m 14 13	$168^{\circ} 34'$ h m 14 34	$190^{\circ} 24'$ h m 14 33
Mar. 20.6	18.41 + .18	56.26 + .18	14.22 +1.14	21.54 + .69	8.66 + .91	3.96 + .17	5.21 + .22	56.56 - .78
30.6	18.57 .13	56.42 .14	15.24 .90	22.06 .42	8.85 .17	4.12 .15	5.96 .08	55.85 .84
Apr. 9.5	18.68 .10	56.55 .11	16.02 .63	22.38 .22	9.00 .12	4.26 .13	6.57 .53	55.29 .47
19.5	18.77 .07	56.64 .08	16.51 .36	22.51 + .04	9.10 .07	4.38 .10	7.03 .37	54.92 .37
29.5	18.82 + .04	56.71 .05	16.74 + .09	22.47 - .14	9.14 + .02	4.45 .06	7.32 .21	54.76 - .07
May 9.5	18.85 .00	56.74 + .03	16.69 - .19	22.23 - .32	9.14 - .02	4.50 + .03	7.45 + .05	54.78 + .13
19.4	18.83 - .04	56.77 + .01	16.37 .45	21.84 .47	9.09 .07	4.51 .00	7.43 - .11	55.01 .22
29.4	18.78 .06	56.76 - .02	15.80 .71	21.30 .61	9.01 .10	4.51 - .02	7.23 .26	55.42 .51
June 8.4	18.70 .08	56.73 .04	14.95 .96	20.63 .73	8.89 .14	4.47 .05	6.88 .43	56.02 .89
18.3	18.62 .09	56.67 .07	13.89 1.17	19.85 .82	8.74 .17	4.41 .07	6.37 .57	56.79 .84
28.3	18.52 - .11	56.59 - .09	12.82 -1.35	19.00 - .89	8.55 - .19	4.33 - .09	5.75 - .89	57.69 + .97
July 8.3	18.39 .13	56.49 .11	11.20 1.49	18.07 .95	8.35 .21	4.23 .11	4.99 .81	58.72 1.06
18.3	18.26 .14	56.38 .12	9.64 1.63	17.11 .97	8.13 .22	4.11 .12	4.14 .89	59.87 1.17
28.2	18.11 - .15	56.25 - .12	7.95 -1.78	16.13 - .98	7.90 - .23	3.99 - .11	3.21 - .95	61.06 +1.23

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Mean Solar Date.	33 Bootis.	47 Cephei, S. P.	$\gamma$ Scorpii.	$\delta$ Bootis.	$\rho$ Octantis.	$\delta$ Cor. Bor.	$\gamma$ Camelop., S. P.	$\delta^1$ Apodis.
	45° 7' h m 14 34	348° 58' h m 14 51	114° 50' h m 14 57	56° 16' h m 15 10	174° 5' h m 15 17	60° 30' h m 15 23	340° 59' h m 15 38	168° 25' h m 16 3
Mar. 30.6	41.38 + .19	8.71 - .54	32.13 + .33	60.27 + .33	46.22 + 1.68	13.61 + .33	30.13 - .43	42.73 + 1.08
Apr. 9.6	41.55 .14	8.23 .33	32.33 .18	60.47 .17	47.76 1.40	13.82 .18	29.78 .38	43.74 .94
19.5	41.67 .09	8.06 - .11	32.48 .14	60.62 .13	49.02 1.10	13.98 .15	29.56 .16	44.61 .80
29.5	41.74 .05	8.05 + .10	32.62 .11	60.73 .10	49.96 .79	14.12 .12	29.46 - .03	45.35 .66
May 9.5	41.78 + .01	8.26 .33	32.72 .09	60.82 .06	50.50 .47	14.22 .07	29.49 + .10	45.93 .51
19.5	41.77 - .04	8.71 + .54	32.78 + .05	60.86 + .02	50.91 + .14	14.27 + .04	29.65 + .33	46.37 + .34
29.4	41.70 .08	9.33 .71	32.82 + .02	60.87 - .01	50.87 - .21	14.30 + .01	29.94 .35	46.61 + .15
June 8.4	41.61 .11	10.13 .86	32.82 - .01	60.85 .05	50.50 .53	14.29 - .03	30.34 .46	46.68 - .01
18.4	41.49 .14	11.03 1.01	32.79 .04	60.77 .08	49.81 .84	14.25 .08	30.86 .55	46.59 .19
28.4	41.33 .17	12.15 1.13	32.75 .07	60.68 .11	48.82 1.15	14.16 .09	31.44 .63	46.30 .37
July 8.3	41.14 - .30	13.31 + 1.30	32.65 - .10	60.56 - .13	47.52 - 1.41	14.06 - .12	32.12 + .71	45.85 - .51
18.3	40.93 .21	14.54 1.35	32.54 .12	60.41 .16	46.01 1.64	13.93 .15	32.86 .76	45.28 .65
28.3	40.71 .23	15.80 1.37	32.41 .14	60.24 .18	44.25 1.82	13.77 .17	33.63 .79	44.55 .79
Aug. 7.2	40.47 .34	17.08 1.37	32.25 .16	60.05 .19	42.38 1.90	13.59 .18	34.42 .79	43.71 .88
17.2	40.23 .23	18.33 1.23	32.09 .17	59.85 .20	40.45 1.94	13.40 .19	35.21 .79	42.79 .94
27.2	40.00 - .32	19.55 + 1.19	31.91 - .18	59.65 - .20	38.51 - 1.92	13.21 - .19	36.00 + .79	41.83 - .96
Mean Solar Date.	$\phi$ Herculis.	$\sigma$ Cor. Bor. (mean.)	$\gamma$ Apodis.	$\eta$ Urs. Min.	$\eta$ Ophiuchi.	$\pi$ Herculis.	$\theta$ Ophiuchi.	$\delta$ Aræ.
	44° 46' h m 16 5	55° 51' h m 16 10	168° 39' h m 16 16	13° 59' h m 16 20	105° 35' h m 17 3	53° 4' h m 17 11	114° 53' h m 17 15	150° 35' h m 17 21
Apr. 9.6	15.47 + .35	30.02 + .34	23.42 + 1.00	50.44 + .83	58.01 + .37	9.60 + .30	8.60 + .31	0.87 + .55
19.6	15.70 .39	30.24 .20	24.36 .88	51.01 .51	58.27 .25	9.88 .26	8.89 .27	1.38 .43
29.6	15.88 .16	30.42 .15	25.17 .73	51.45 .37	58.51 .22	10.12 .22	9.14 .24	1.83 .43
May 9.6	16.03 .13	30.55 .12	25.81 .58	51.74 .21	58.72 .19	10.33 .18	9.37 .22	2.25 .38
19.5	16.14 .08	30.67 .09	26.32 .41	51.87 + .06	58.90 .16	10.49 .15	9.58 .19	2.60 .32
29.5	16.18 + .03	30.73 + .04	26.63 + .23	51.86 - .09	59.05 + .13	10.63 + .12	9.75 + .16	2.90 + .36
June 8.5	16.19 - .02	30.76 + .01	26.78 + .05	51.69 .25	59.17 .11	10.72 .08	9.90 .13	3.13 .19
18.4	16.14 .07	30.75 - .03	26.72 - .13	51.37 .39	59.27 .07	10.79 + .03	10.01 .08	3.29 .11
28.4	16.05 .11	30.70 .07	26.52 .30	50.91 .52	59.31 + .02	10.77 - .03	10.06 .04	3.36 + .04
July 8.4	15.92 .15	30.61 .10	26.11 .49	50.33 .64	59.31 - .01	10.73 .07	10.09 + .01	3.37 - .03
18.4	15.74 - .19	30.49 - .14	25.54 - .64	49.64 - .74	59.30 - .04	10.64 - .11	10.08 - .04	3.30 - .11
28.3	15.53 .22	30.33 .17	24.83 .77	48.86 .89	59.22 .08	10.51 .15	10.01 .08	3.15 .18
Aug. 7.3	15.30 .24	30.14 .19	24.01 .88	48.01 .88	59.13 .11	10.33 .18	9.91 .11	2.94 .25
17.3	15.05 .27	29.94 .21	23.07 .96	47.10 .93	59.00 .14	10.14 .21	9.78 .14	2.66 .31
27.3	14.77 .28	29.72 .22	22.10 .99	46.16 .95	58.85 .16	9.91 .23	9.62 .17	2.33 .35
Sept. 6.2	14.50 - .27	29.49 - .22	21.09 - 1.00	45.21 - .94	58.67 - .18	9.67 - .24	9.43 - .19	1.97 - .37
16.2	14.23 .26	29.27 .22	20.11 .95	44.27 .90	58.49 .17	9.43 .25	9.24 .19	1.59 .37
26.2	13.97 .24	29.05 .23	19.19 .87	43.41 .84	58.32 .16	9.17 .24	9.05 .17	1.22 .35
Oct. 6.1	13.75 - .20	28.81 - .23	18.37 - .76	42.60 - .78	58.17 - .14	8.94 - .22	8.89 - .15	0.88 - .33

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Mean Solar Date.	Groombr. 944, S. P.	$\epsilon$ Herculis.	$\theta$ Herculis.	$\sigma$ Herculis.	$\lambda$ Sagittarii.	$\chi$ Draconis.	$\zeta$ Pavonia.	$\gamma$ Lyrae.
	355° 8' h m 17 25	43° 56' h m 17 36	52° 44' h m 17 52	61° 15' h m 18 3	115° 29' h m 18 21	17° 19' h m 18 23	161° 31' h m 18 29	57° 28' h m 18 54
May 19.6	58.22 - .48	20.18 + .18	26.36 + .21	12.01 + .19	5.02 + .25	8.28 + .48	60.43 + .05	46.66 + .38
29.6	57.97 - .03	20.34 .14	26.54 .15	12.18 .15	5.25 .28	8.64 .30	61.03 .35	46.90 .28
June 8.5	58.18 + .44	20.46 .09	26.66 .11	12.31 .11	5.45 .19	8.88 .18	61.54 .45	47.10 .18
18.5	58.85 .80	20.51 + .04	26.76 .07	12.41 .07	5.63 .15	9.00 + .06	61.93 .34	47.26 .14
28.5	59.96 1.38	20.53 - .01	26.80 + .08	12.45 + .08	5.76 .11	8.99 - .08	62.22 .23	47.38 .00
July 8.4	61.48 + 1.70	20.49 - .07	26.80 - .03	12.45 - .03	5.86 + .06	8.84 - .21	62.38 + .10	47.44 + .05
18.4	63.36 2.04	20.39 .12	26.74 .07	12.39 .07	5.89 + .01	8.58 .32	62.42 - .08	47.48 + .01
28.4	65.55 2.34	20.25 .17	26.66 .11	12.31 .11	5.88 - .03	8.21 .43	62.34 .14	47.46 - .05
Aug. 7.4	68.04 2.60	20.05 .22	26.51 .16	12.16 .16	5.82 .07	7.73 .53	62.13 .27	47.38 .10
17.3	70.74 2.78	19.82 .25	26.33 .19	11.98 .19	5.74 .10	7.16 .68	61.81 .38	47.27 .14
27.3	73.59 +2.91	19.56 - .27	26.13 - .22	11.78 - .22	5.61 - .15	6.49 - .60	61.38 - .47	47.11 - .17
Sept. 6.3	76.56 3.00	19.27 .29	25.89 .24	11.54 .24	5.44 .17	5.78 .74	60.88 .54	46.92 .20
16.2	79.50 2.99	18.97 .30	25.64 .25	11.29 .25	5.26 .18	5.01 .79	60.30 .58	46.70 .22
26.2	82.61 2.97	18.68 .30	25.39 .26	11.04 .26	5.07 .19	4.21 .79	59.71 .60	46.48 .23
Oct. 6.2	85.58 2.90	18.38 .28	25.13 .25	10.78 .25	4.88 .18	3.42 .79	59.10 .61	46.24 .24
16.2	88.43 +2.78	18.11 - .27	24.89 - .22	10.54 - .24	4.70 - .17	2.63 - .78	58.50 - .60	46.01 - .23
Mean Solar Date.	$\epsilon$ Lyrae.	25 Camelop. S. P.	$\theta$ Lyrae.	$\beta$ Cygni.	$\beta$ Sagittae.	$\delta$ Cygni.	Groombr. 1374, S. P.	$\epsilon$ Pavonia.
	54° 5' h m 19 3	352° 37' h m 19 7	52° 4' h m 19 12	62° 17' h m 19 26	72° 47' h m 19 36	45° 9' h m 19 41	344° 13' h m 19 46	163° 12' h m 19 47
May 29.6	20.01 + .25	20.82 - .67	32.46 + .25	13.78 + .22	2.48 + .24	30.22 + .28	43.18 - .28	40.70 + .79
June 8.6	20.23 .19	20.30 .37	32.69 .20	14.00 .21	2.71 .22	30.48 .24	42.87 .24	41.43 .68
18.6	20.39 .14	20.08 - .07	32.87 .15	14.21 .18	2.92 .19	30.70 .19	42.69 - .12	42.07 .58
28.5	20.51 .10	20.16 + .22	33.00 .11	14.35 .13	3.08 .15	30.86 .14	42.63 + .01	42.60 .49
July 8.5	20.58 .05	20.51 .49	33.09 .05	14.46 .09	3.21 .10	30.38 .09	42.72 .14	43.01 .25
18.5	20.61 + .01	21.14 + .77	33.11 + .01	14.53 + .04	3.28 + .06	31.04 + .03	42.92 + .27	43.29 + .21
28.5	20.60 - .04	22.05 1.03	33.11 - .04	14.55 - .01	3.33 + .02	31.04 - .03	43.26 .40	43.43 + .07
Aug. 7.4	20.52 .09	23.19 1.25	33.03 .09	14.52 .06	3.33 - .03	30.98 .06	43.72 .48	43.43 - .08
17.4	20.41 .14	24.54 1.45	32.92 .13	14.44 .10	3.27 .07	30.88 .13	44.26 .58	43.27 .21
27.4	20.25 .18	26.08 1.64	32.76 .18	14.32 .14	3.18 .10	30.72 .18	44.92 .71	43.00 .23
Sept. 6.3	20.05 - .21	27.81 + 1.80	32.56 - .21	14.17 - .17	3.07 - .13	30.52 - .22	45.68 + .79	42.61 - .45
16.3	19.84 .23	29.67 1.91	32.34 .23	13.98 .20	2.91 .17	30.28 .24	46.50 .28	42.10 .25
26.3	19.59 .25	31.62 1.99	32.10 .25	13.77 .21	2.73 .19	30.03 .27	47.40 .22	41.52 .61
Oct. 6.3	19.35 .25	33.64 2.04	31.84 .25	13.55 .22	2.54 .19	29.76 .28	48.35 .26	40.89 .65
16.3	19.10 .24	35.70 2.03	31.59 .25	13.34 .21	2.35 .19	29.46 .28	49.32 .27	40.23 .28
26.2	18.86 - .22	37.71 +2.00	31.34 - .22	13.13 - .20	2.16 - .17	29.16 - .28	50.30 + .28	39.57 - .44
Nov. 5.2	18.66 - .18	39.71 + 1.98	31.12 - .20	12.93 - .19	2.01 - .13	28.89 - .28	51.30 + 1.00	38.94 - .28

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Mean Solar Date.	$\gamma$ Sagittæ.	$\alpha$ Sagittarii.	$\theta$ Aquilæ.	31 Cygni.	$\alpha$ Delphini.	$\beta$ Pavonis.	$\psi$ Capricor.	$\epsilon$ Cygni.
	70° 49' h m 19 53	118° 1' h m 19 55	91° 9' h m 20 5	43° 36' h m 20 10	74° 29' h m 20 34	156° 36' h m 20 34	115° 40' h m 20 39	56° 27' h m 20 41
June 18.6	48.37 + .30	48.05 + .96	33.21 + .30	8.48 + .32	27.78 + .32	54.54 + .54	29.37 + .35	42.58 + .34
23.6	48.55 .16	48.28 .30	33.40 .17	8.68 .18	27.99 .30	55.04 .46	29.61 .33	42.81 .31
July 8.6	48.69 .11	48.45 .16	33.56 .14	8.84 .13	28.18 .16	55.45 .37	29.84 .21	43.01 .16
18.5	48.79 .07	48.60 .12	33.69 .10	8.94 .06	28.31 .11	55.78 .38	30.03 .16	43.14 .11
23.5	48.84 + .03	48.69 .07	33.77 .05	8.98 + .01	28.41 .07	56.01 .17	30.15 .10	43.24 .06
Aug. 7.5	48.85 - .01	48.73 + .01	33.80 + .01	8.96 - .04	28.45 + .03	56.13 + .06	30.22 + .05	43.27 + .01
17.4	48.82 .06	48.71 - .04	33.79 - .03	8.87 .11	28.47 - .01	56.14 - .04	30.26 + .01	43.26 - .03
27.4	48.73 .10	48.65 .08	33.75 .06	8.75 .16	28.43 .08	56.06 .14	30.24 - .04	43.21 .07
Sept. 6.4	48.62 .13	48.56 .12	33.66 .10	8.56 .30	28.35 .10	55.87 .24	30.18 .08	43.11 .12
16.4	48.48 .16	48.42 .15	33.54 .13	8.35 .34	28.24 .13	55.58 .32	30.09 .12	42.97 .16
26.3	48.30 - .18	48.25 - .17	33.40 - .15	8.09 - .38	28.10 - .15	55.24 - .38	29.95 - .15	42.79 - .18
Oct. 6.3	48.11 .19	48.08 .18	33.25 .16	7.80 .39	27.94 .17	54.82 .43	29.80 .17	42.60 .30
16.3	47.93 .19	47.88 .19	33.08 .17	7.51 .38	27.76 .18	54.38 .45	29.61 .18	42.39 .31
26.2	47.73 .18	47.70 .17	32.92 .16	7.23 .38	27.58 .17	53.92 .46	29.44 .17	42.18 .31
Nov. 5.2	47.57 .16	47.54 .15	32.76 .15	6.95 .37	27.43 .16	53.46 .48	29.27 .16	41.97 .30
15.2	47.41 - .14	47.39 - .13	32.62 - .12	6.68 - .35	27.27 - .15	53.03 - .40	29.12 - .15	41.76 - .19
25.2	47.30 - .11	47.27 - .10	32.52 - .08	6.44 - .32	27.13 - .13	52.65 - .36	28.96 - .13	41.58 - .17
Mean Solar Date.	$\tau$ Cygni.	$\zeta$ Capricor.	74 Cygni.	$\lambda$ Octantis.	$\zeta$ Chamæle- ontis, S.P.	$\pi^1$ Cygni.	16 Pegasi.	$\pi$ Pegasi.
	52° 26' h m 21 10	112° 54' h m 21 20	50° 5' h m 21 32	173° 14' h m 21 33	189° 34' h m 21 37	41° 13' h m 21 42	64° 36' h m 21 47	57° 22' h m 22 5
July 8.6	21.46 + .19	18.18 + .34	29.82 + .32	47.77 +1.43	4.38 - .30	41.78 + .37	59.88 + .34	2.78 + .35
18.6	21.63 .15	18.40 .19	30.02 .17	49.05 1.14	3.64 .67	42.02 .30	60.10 .17	3.01 .30
28.5	21.76 .10	18.56 .14	30.17 .13	50.04 .84	3.05 .47	42.18 .14	60.25 .13	3.19 .16
Aug. 7.5	21.83 + .05	18.69 .10	30.28 .07	50.73 .58	2.71 .25	42.30 .08	60.37 .10	3.33 .11
17.5	21.85 .00	18.75 + .05	30.32 + .02	51.08 + .18	2.55 - .05	42.34 + .02	60.44 .06	3.42 .07
27.5	21.83 - .06	18.78 + .01	30.32 - .03	51.10 - .15	2.62 + .30	42.34 - .03	60.48 + .01	3.47 + .02
Sept. 6.4	21.74 .10	18.77 - .04	30.25 .08	50.78 .50	2.96 .44	42.28 .08	60.46 - .04	3.46 - .03
16.4	21.63 .14	18.70 .08	30.15 .12	50.11 .81	3.49 .64	42.17 .14	60.39 .08	3.41 .07
26.4	21.47 .18	18.60 .11	30.01 .16	49.16 1.09	4.23 .84	41.99 .19	60.31 .11	3.33 .10
Oct. 6.4	21.27 .30	18.48 .13	29.82 .19	47.94 1.33	5.18 1.04	41.78 .32	60.18 .13	3.21 .14
16.3	21.07 - .31	18.34 - .15	29.62 - .20	46.51 -1.51	6.31 +1.19	41.55 - .34	60.04 - .15	3.06 - .16
26.3	20.85 .22	18.18 .17	29.41 .31	44.93 1.64	7.56 1.98	41.30 .36	59.88 .16	2.89 .18
Nov. 5.3	20.64 .22	18.01 .16	29.19 .22	43.24 1.63	8.87 1.33	41.03 .37	59.71 .17	2.71 .18
15.2	20.42 .31	17.86 .14	28.97 .21	41.56 1.66	10.22 1.36	40.75 .38	59.54 .16	2.52 .19
25.2	20.22 .19	17.72 .13	28.76 .20	39.91 1.59	11.57 1.30	40.48 .36	59.38 .15	2.33 .17
Dec. 5.2	20.03 - .18	17.00 - .10	28.56 - .19	38.38 -1.47	12.83 +1.20	40.23 - .33	59.24 - .13	2.18 - .13

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Mean Solar Date.	$\nu$ Octantis.	$\gamma$ Aquarii.	$\sigma$ Aquarii.	$\alpha$ Lacertæ.	10 Lacertæ.	$\beta$ Octantis.	$\lambda$ Pegasi.	Groombr. 1706, S.P.
	176° 32' h m 22 9	91° 57' h m 22 15	101° 15' h m 22 24	40° 18' h m 22 26	51° 32' h m 22 34	171° 58' h m 22 34	67° 1' h m 22 41	348° 22' h m 22 50
July 8.6	71.92 +2.97	53.90 + .97	44.68 + .97	42.94 + .30	16.12 + .26	38.63 +1.40	9.87 + .26	54.29 - .64
18.6	74.69 2.53	54.14 .92	44.93 .93	43.22 .96	16.37 .23	39.96 1.96	10.13 .94	53.72 .50
28.6	76.99 2.03	54.33 .17	45.14 .19	43.46 .90	16.59 .90	41.15 1.06	10.35 .19	53.29 .37
Aug. 7.5	78.74 1.45	54.48 .13	45.31 .14	43.63 .14	16.77 .15	42.08 .81	10.51 .15	52.98 .34
17.5	79.90 .83	54.60 .09	45.43 .10	43.75 .08	16.90 .10	42.77 .55	10.65 .11	52.81 - .10
27.5	80.41 + .18	54.67 + .05	45.51 + .06	43.80 + .03	16.97 + .04	43.17 + .27	10.74 + .06	52.78 + .05
Sept. 6.5	80.26 - .49	54.69 + .01	45.55 + .02	43.81 - .03	16.99 .00	43.31 - .02	10.78 + .02	52.90 .21
16.4	79.43 1.12	54.69 - .03	45.56 - .01	43.75 .08	16.97 - .04	43.13 .32	10.79 - .02	53.21 .36
26.4	78.03 1.71	54.64 .07	45.53 .06	43.65 .12	16.90 .08	42.68 .58	10.75 .06	53.65 .52
Oct. 6.4	76.02 2.26	54.56 .09	45.46 .08	43.51 .17	16.80 .12	41.97 .82	10.67 .09	54.25 .66
16.4	73.48 -2.70	54.46 - .11	45.36 - .10	43.31 - .30	16.66 - .14	41.05 -1.03	10.57 - .11	54.97 + .82
26.3	70.59 3.05	54.35 .12	45.24 .12	43.11 .22	16.51 .16	39.91 1.21	10.46 .12	55.88 .95
Nov. 5.3	67.39 3.28	54.21 .13	45.11 .13	42.87 .24	16.33 .19	38.63 1.33	10.32 .13	56.87 1.05
15.3	64.03 3.39	54.08 .13	44.98 .13	42.62 .25	16.13 .19	37.25 1.40	10.19 .15	57.98 1.16
25.2	60.65 3.33	53.95 .12	44.85 .12	42.36 .26	15.95 .19	35.83 1.41	10.03 .15	59.19 1.22
Dec. 5.2	57.36 -3.17	53.83 - .11	44.73 - .11	42.10 - .25	15.75 - .19	34.43 -1.37	9.89 - .14	60.43 +1.25
15.2	54.32 -2.90	53.73 - .09	44.62 - .10	41.85 - .24	15.56 - .18	33.09 -1.29	9.76 - .13	61.70 +1.26
Mean Solar Date.	$\sigma$ Androm.	$\phi$ Aquarii.	$\tau$ Pegasi.	$\lambda$ Androm.	$\epsilon^1$ Aquarii.	$\delta$ Sculptoris.	$\gamma^1$ Octantis.	33 Piscium.
	48° 17' h m 22 56	96° 39' h m 23 8	66° 52' h m 23 15	44° 9' h m 23 32	108° 54' h m 23 38	118° 45' h m 23 43	172° 38' h m 23 45	96° 20' h m 23 59
July 28.6	48.55 + .94	33.22 + .94	7.67 + .23	7.48 + .27	25.29 + .96	7.23 + .96	34.95 +1.46	37.81 + .25
Aug. 7.6	48.76 .18	33.43 .18	7.88 .18	7.73 .23	25.53 .22	7.48 .23	36.31 1.96	38.05 .22
17.6	48.91 .13	33.58 .14	8.04 .14	7.94 .18	25.73 .18	7.70 .19	37.47 1.03	38.26 .18
27.6	49.02 .08	33.71 .10	8.16 .10	8.09 .13	25.89 .13	7.86 .15	38.37 .76	38.42 .14
Sept. 6.5	49.07 + .03	33.79 .06	8.24 .06	8.20 .08	26.00 .09	8.00 .11	39.00 .46	38.55 .11
16.5	49.07 - .01	33.83 + .02	8.28 + .02	8.25 + .03	26.08 + .06	8.08 + .06	39.30 + .16	38.65 + .07
26.5	49.04 .06	33.83 - .01	8.29 - .02	8.26 - .01	26.12 + .01	8.12 + .02	39.33 - .15	38.70 + .03
Oct. 6.4	48.95 .10	33.81 .04	8.25 .05	8.23 .06	26.11 - .03	8.12 - .02	39.00 .46	38.72 .00
16.4	48.83 .13	33.74 .07	8.18 .08	8.14 .09	26.07 .05	8.08 .06	38.41 .74	38.70 - .03
26.4	48.70 .16	33.66 .09	8.09 .10	8.04 .12	26.01 .07	8.00 .09	37.52 1.01	38.67 .06
Nov. 5.4	48.52 - .18	33.56 - .10	7.98 - .12	7.89 - .16	25.92 - .10	7.90 - .11	36.39 -1.23	38.59 - .06
15.3	48.33 .19	33.44 .11	7.85 .13	7.71 .19	25.82 .12	7.79 .12	35.06 1.39	38.51 .09
25.3	48.13 .20	33.33 .12	7.73 .14	7.51 .20	25.69 .12	7.66 .13	33.61 1.50	38.42 .10
Dec. 5.3	47.92 .20	33.21 .12	7.58 .14	7.30 .21	25.57 .12	7.52 .14	32.06 1.57	38.31 .11
15.3	47.72 .19	33.09 .11	7.45 .14	7.09 .22	25.45 .12	7.38 .14	30.48 1.56	38.20 .11
25.2	47.53 - .19	32.99 - .09	7.31 - .13	6.87 - .22	25.33 - .11	7.24 - .14	28.93 -1.49	38.09 - .11
35.2	47.34 - .18	32.91 - .07	7.19 - .11	6.66 - .21	25.23 - .09	7.11 - .13	27.46 -1.38	37.98 - .11

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
Jan. 0	h m s 1 42 30.60	s 31.21	° ' " -23 5 31.5	31.0	s 11.048	+ " +11.92	m s + 3 17.15	16 18.44	m s 11 11.13	h m s 18 39 13.52
1	18 46 55.61	56.30	23 0 48.3	47.6	11.036	12.37	3 45.62	16 18.44	11 10.09	18 43 10.08
2	18 51 20.31	21.09	22 55 37.6	36.7	11.022	13.52	4 13.77	16 18.43	11 10.05	18 47 6.63
3	18 55 44.68	45.54	22 49 59.4	58.3	11.008	14.66	4 41.58	16 18.42	11 10.00	18 51 3.19
4	19 0 8.68	9.63	22 43 54.0	52.7	10.992	15.79	5 9.02	16 18.40	11 09.94	18 54 59.75
5	19 4 32.28	33.31	-22 37 21.7	20.1	10.975	+16.91	+ 5 36.07	16 18.38	11 09.88	18 58 56.31
6	19 8 55.46	56.57	22 30 22.4	20.7	10.967	18.02	6 2.70	16 18.35	11 09.82	19 2 52.86
7	19 13 18.19	19.38	22 22 56.5	54.5	10.938	19.13	6 28.89	16 18.31	11 09.76	19 6 49.42
8	19 17 40.45	41.72	22 15 4.1	1.8	10.917	20.22	6 54.59	16 18.27	11 09.69	19 10 45.07
9	19 22 2.20	3.54	22 6 45.5	42.9	10.895	21.31	7 19.79	16 18.23	11 09.62	19 14 42.53
10	19 26 23.42	24.83	-21 57 61.0	58.1	10.873	+22.38	+ 7 44.46	16 18.19	11 09.54	19 18 39.08
11	19 30 44.08	45.55	21 48 50.7	47.5	10.849	23.44	8 8.57	16 18.14	11 09.46	19 22 35.64
12	19 35 4.15	5.69	21 39 15.0	11.5	10.823	24.50	8 32.09	16 18.09	11 09.38	19 26 32.20
13	19 39 23.62	25.22	21 29 14.1	10.3	10.797	25.55	8 55.00	16 18.03	11 09.29	19 30 28.76
14	19 43 42.44	44.10	21 18 48.3	44.2	10.770	26.58	9 17.27	16 17.97	11 09.20	19 34 25.31
15	19 48 0.60	- 2.32	-21 7 57.9	53.5	10.743	+27.60	+ 9 38.87	16 17.90	11 09.11	19 38 21.87
16	19 52 18.07	19.85	20 56 43.2	38.5	10.714	28.61	9 59.78	16 17.83	11 09.02	19 42 18.43
17	19 56 34.83	36.68	20 44 64.6	59.5	10.684	29.60	10 19.99	16 17.75	11 08.92	19 46 14.99
18	20 0 50.88	52.78	20 32 62.4	56.9	10.653	30.57	10 39.48	16 17.67	11 08.82	19 50 11.54
19	20 5 6.18	8.13	20 20 36.9	31.1	10.622	31.53	10 58.22	16 17.59	11 08.72	19 54 8.10
20	20 9 20.71	22.71	-20 7 48.5	42.4	10.590	+32.48	+11 16.20	16 17.51	11 08.62	19 58 4.65
21	20 13 34.47	36.51	19 54 37.5	31.0	10.557	33.41	11 33.40	16 17.42	11 08.51	20 2 1.21
22	20 17 47.44	49.52	19 40 64.3	57.4	10.524	34.33	11 49.81	16 17.32	11 08.41	20 5 57.76
23	20 21 59.61	61.73	19 27 9.3	2.0	10.491	35.24	12 5.42	16 17.22	11 08.30	20 9 54.32
24	20 26 10.98	13.14	19 12 52.7	45.2	10.458	36.13	12 20.23	16 17.12	11 08.19	20 13 50.88
25	20 30 21.55	23.74	-18 58 15.0	7.2	10.424	+37.00	+12 34.23	16 17.00	11 08.08	20 17 47.44
26	20 34 31.31	33.52	18 43 16.5	8.4	10.390	37.86	12 47.42	16 16.88	11 07.97	20 21 43.99
27	20 38 40.24	42.48	18 27 57.7	49.3	10.356	38.70	12 59.80	16 16.76	11 07.86	20 25 40.55
28	20 42 48.36	50.63	18 12 18.8	10.1	10.322	39.52	13 11.36	16 16.63	11 07.75	20 29 37.10
29	20 46 55.67	57.96	17 56 20.4	11.4	10.288	40.33	13 22.10	16 16.50	11 07.63	20 33 33.66
30	20 51 2.16	4.47	-17 39 62.8	53.5	10.254	+41.13	+13 32.03	16 16.36	11 07.52	20 37 30.21
31	20 55 7.84	10.17	17 23 26.3	16.7	10.220	41.90	13 41.15	16 16.21	11 07.40	20 41 26.77
Feb. 1	20 59 12.72	15.07	17 6 31.3	21.5	10.186	42.66	13 49.47	16 16.06	11 07.29	20 45 23.32
2	21 3 16.79	19.15	16 49 18.2	8.2	10.153	43.41	13 56.98	16 15.91	11 07.17	20 49 19.68
3	21 7 20.05	22.42	16 31 47.6	37.3	10.119	44.13	14 3.69	16 15.75	11 07.05	20 53 16.43
4	21 11 22.52	24.90	-16 13 59.6	49.1	10.086	+44.85	+14 9.60	16 15.58	11 06.93	20 57 12.99
5	21 15 24.19	26.58	15 55 54.8	44.0	10.053	45.54	14 14.70	16 15.41	11 06.81	21 1 9.54
6	21 19 25.07	27.46	15 37 33.6	22.6	10.020	46.22	14 19.01	16 15.24	11 06.69	21 5 6.10
7	21 23 25.16	27.55	15 18 56.3	45.1	9.987	46.88	14 22.53	16 15.06	11 06.58	21 9 2.65
8	21 27 24.46	26.85	14 59 63.3	51.9	9.955	47.52	14 25.27	16 14.88	11 06.47	21 12 59.21
9	21 31 22.98	25.37	-14 40 55.2	43.6	9.922	+48.15	+14 27.23	16 14.70	11 06.36	21 16 55.76
10	21 35 20.72	23.11	14 21 32.4	20.6	9.890	48.76	14 28.42	16 14.51	11 06.25	21 20 52.32
11	21 39 17.69	20.08	14 1 55.2	43.3	9.858	49.34	14 28.84	16 14.32	11 06.14	21 24 48.87
12	21 43 13.90	16.28	13 41 64.0	52.0	9.826	49.91	14 28.48	16 14.13	11 06.03	21 28 45.42
13	21 47 9.35	11.72	13 21 59.4	47.3	9.794	50.47	14 27.36	16 13.94	11 05.92	21 32 41.97
14	21 51 4.03	6.39	-13 1 41.8	29.5	9.763	+51.00	+14 25.48	16 13.74	11 05.81	21 36 38.53
15	21 54 57.96	60.31	-12 40 71.4	59.1	9.732	+51.52	+14 22.86	16 13.54	11 05.70	21 40 35.08

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0<sup>m</sup>.19 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
	h m s	s	° ' "	"	s	"	m s	' "	m s	h m s
Feb. 15	21 54 57.96	60.31	-12 40 71.4	59.1	9.739	+51.53	+14 22.86	16 13.54	1 6.70	21 40 35.08
16	21 58 51.15	53.48	12 20 28.9	16.5	9.701	52.01	14 19.49	16 13.34	1 6.60	21 44 31.64
17	22 2 43.61	45.92	11 59 34.7	22.2	9.671	52.49	14 15.38	16 13.14	1 6.50	21 48 28.19
18	22 6 35.35	37.64	11 38 29.1	16.6	9.641	52.96	14 10.56	16 12.94	1 6.40	21 52 24.75
19	22 10 26.38	28.65	11 17 12.6	0.1	9.612	53.40	14 5.03	16 12.73	1 6.30	21 56 21.30
20	22 14 16.72	18.96	-10 55 45.6	33.1	9.583	+53.83	+13 58.81	16 12.51	1 6.21	22 0 17.86
21	22 18 6.38	8.59	10 33 68.6	56.0	9.555	54.25	13 51.91	16 12.29	1 6.11	22 4 14.41
22	22 21 55.38	57.56	10 12 21.8	9.3	9.528	54.64	13 44.35	16 12.08	1 6.02	22 8 10.96
23	22 25 43.73	45.88	9 50 25.8	13.3	9.502	55.03	13 36.14	16 11.86	1 5.93	22 12 7.51
24	22 29 31.45	33.57	9 28 20.8	8.4	9.477	55.38	13 27.31	16 11.63	1 5.84	22 16 4.06
25	22 33 18.57	20.66	-9 5 67.5	55.1	9.459	+55.73	+13 17.87	16 11.40	1 5.75	22 20 0.61
26	22 37 5.10	7.15	8 43 46.1	33.8	9.437	56.06	13 7.85	16 11.17	1 5.67	22 23 57.17
27	22 40 51.08	53.09	8 21 16.9	4.7	9.404	56.36	12 57.27	16 10.93	1 5.59	22 27 53.72
28	22 44 36.50	38.49	7 58 40.4	28.2	9.383	56.66	12 46.15	16 10.69	1 5.51	22 31 50.27
29	22 48 21.40	23.36	7 35 56.9	44.9	9.362	56.95	12 34.50	16 10.45	1 5.44	22 35 46.82
Mar. 1	22 52 5.81	7.73	-7 12 67.0	55.1	9.341	+57.21	+12 22.34	16 10.20	1 5.37	22 39 43.38
2	22 55 49.74	51.63	6 49 70.8	59.1	9.321	57.46	12 9.71	16 9.94	1 5.30	22 43 39.93
3	22 59 33.21	35.06	6 26 68.8	57.3	9.302	57.70	11 56.62	16 9.68	1 5.23	22 47 36.49
4	23 3 16.24	18.05	6 3 61.4	50.0	9.284	57.91	11 43.10	16 9.43	1 5.16	22 51 33.04
5	23 6 58.86	60.63	5 40 48.9	37.7	9.268	58.12	11 29.16	16 9.17	1 5.10	22 55 29.59
6	23 10 41.09	42.92	-5 17 31.7	20.7	9.252	+58.31	+11 14.83	16 8.91	1 5.04	22 59 26.14
7	23 14 22.93	24.62	4 53 70.2	59.4	9.236	58.47	11 0.12	16 8.64	1 4.99	23 3 22.70
8	23 18 4.41	6.06	4 30 44.9	34.3	9.221	58.63	10 45.05	16 8.38	1 4.93	23 7 19.25
9	23 21 45.55	47.16	4 7 16.1	5.8	9.207	58.77	10 29.65	16 8.11	1 4.88	23 11 15.80
10	23 25 26.36	27.93	3 43 44.2	34.1	9.194	58.88	10 13.92	16 7.85	1 4.83	23 15 12.35
11	23 29 6.85	8.38	-3 19 69.4	59.6	9.181	+58.99	+9 57.86	16 7.58	1 4.79	23 19 8.91
12	23 32 47.07	48.54	2 56 32.3	22.7	9.170	59.08	9 41.50	16 7.32	1 4.74	23 23 5.46
13	23 36 27.00	28.44	2 32 53.3	43.9	9.159	59.15	9 24.88	16 7.05	1 4.70	23 27 2.01
14	23 40 6.68	8.08	2 9 12.7	3.6	9.148	59.21	9 8.01	16 6.79	1 4.66	23 30 58.56
15	23 43 46.11	47.46	1 45 31.0	22.2	9.139	59.25	8 50.89	16 6.52	1 4.63	23 34 55.11
16	23 47 25.31	26.61	-1 21 48.5	40.1	9.130	+59.28	+8 33.54	16 6.25	1 4.60	23 38 51.66
17	23 51 4.30	5.56	0 57 65.6	57.5	9.121	59.29	8 15.98	16 5.98	1 4.58	23 42 48.22
18	23 54 43.10	44.31	0 34 22.7	14.9	9.114	59.28	7 58.24	16 5.72	1 4.56	23 46 44.77
19	23 58 21.73	22.90	-0 10 40.1	32.6	9.107	59.25	7 40.32	16 5.45	1 4.54	23 50 41.32
20	0 2 0.21	1.33	+0 13 1.7	8.9	9.101	59.22	7 22.21	16 5.18	1 4.52	23 54 37.87
21	0 5 38.55	39.62	+0 36 42.3	49.3	9.095	+59.17	+7 4.04	16 4.91	1 4.50	23 58 34.43
22	0 9 16.79	17.81	1 0 21.6	28.2	9.091	59.10	6 45.74	16 4.64	1 4.49	0 2 30.98
23	0 12 54.94	55.92	1 23 59.1	65.4	9.089	59.02	6 27.34	16 4.37	1 4.48	0 6 27.53
24	0 16 33.03	33.96	1 47 34.4	40.4	9.087	58.92	6 8.88	16 4.10	1 4.47	0 10 24.08
25	0 20 11.07	11.96	2 11 7.1	12.8	9.085	58.80	5 50.36	16 3.83	1 4.47	0 14 20.64
26	0 23 49.09	49.93	+2 34 37.0	42.4	9.085	+58.68	+5 31.83	16 3.56	1 4.47	0 18 17.19
27	0 27 27.12	27.92	2 58 3.7	8.8	9.085	58.54	5 13.31	16 3.28	1 4.47	0 22 13.74
28	0 31 5.18	5.93	3 21 28.9	31.7	9.087	58.39	4 54.83	16 3.00	1 4.47	0 26 10.29
29	0 34 43.30	44.00	3 44 46.2	50.7	9.090	58.22	4 36.40	16 2.72	1 4.48	0 30 6.84
30	0 38 21.49	22.14	4 8 1.4	5.5	9.093	58.04	4 18.04	16 2.44	1 4.49	0 34 3.39
31	0 41 59.77	60.38	+4 31 12.1	15.9	9.097	+57.85	+3 59.77	16 2.16	1 4.51	0 37 59.95
32	0 45 38.18	38.74	+4 54 17.9	21.5	9.103	+57.63	+3 41.63	16 1.88	1 4.52	0 41 56.50

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. of Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
	h m s	s	° ' "	"	s	"	m s	' "	m s	h m s
Apr. 1	0 45 38.18	38.74	+ 4 54 17.9	21.5	9.103	+57.63	+3 41.63	16 1.88	1 4.52	0 41 56.50
2	0 49 16.74	17.25	5 17 18.7	21.9	9.109	57.41	3 23.64	16 1.59	1 4.54	0 45 53.05
3	0 52 55.46	55.93	5 40 13.9	16.8	9.117	57.18	3 5.81	16 1.30	1 4.56	0 49 49.60
4	0 56 34.35	34.78	6 3 3.2	5.8	9.125	56.92	2 48.15	16 1.02	1 4.59	0 53 46.16
5	1 0 13.44	13.92	6 25 46.4	48.8	9.134	56.66	2 30.69	16 0.74	1 4.62	0 57 42.71
6	1 3 52.75	53.09	+ 6 48 23.2	25.4	9.143	+56.39	+2 13.46	16 0.46	1 4.65	1 1 39.26
7	1 7 32.30	32.59	7 10 53.1	55.0	9.153	56.09	1 56.46	16 0.18	1 4.68	1 5 35.81
8	1 11 12.09	12.34	7 33 15.7	17.3	9.164	55.78	1 39.70	15 59.90	1 4.72	1 9 32.37
9	1 14 52.14	52.35	7 55 30.8	32.1	9.175	55.46	1 23.21	15 59.62	1 4.76	1 13 28.92
10	1 18 32.48	32.65	8 17 38.0	39.0	9.187	55.12	1 7.00	15 59.35	1 4.80	1 17 25.47
11	1 22 13.11	13.24	+ 8 39 36.9	37.7	9.199	+54.77	+0 51.08	15 59.08	1 4.84	1 21 22.02
12	1 25 54.03	54.12	9 1 27.2	27.8	9.212	54.40	0 35.45	15 58.81	1 4.89	1 25 18.58
13	1 29 35.27	35.32	9 23 8.4	8.7	9.225	54.02	0 20.13	15 58.54	1 4.93	1 29 15.13
14	1 33 16.83	16.84	9 44 40.3	40.4	9.239	53.62	+0 5.14	15 58.28	1 4.98	1 33 11.69
15	1 36 58.73	58.70	10 6 2.5	2.4	9.253	53.21	-0 9.51	15 58.02	1 5.03	1 37 8.24
16	1 40 40.98	40.91	+10 27 14.7	14.4	9.268	+52.79	-0 23.81	15 57.76	1 5.09	1 41 4.79
17	1 44 23.60	23.49	10 48 16.4	15.9	9.283	52.34	0 37.74	15 57.50	1 5.15	1 45 1.34
18	1 48 6.60	6.46	11 9 7.4	6.7	9.300	51.89	0 51.29	15 57.25	1 5.21	1 48 57.90
19	1 51 49.99	49.81	11 29 47.3	46.4	9.317	51.42	1 4.46	15 57.00	1 5.27	1 52 54.45
20	1 55 33.78	33.57	11 50 15.7	14.6	9.334	50.94	1 17.22	15 56.75	1 5.34	1 56 51.01
21	1 59 17.99	17.75	+12 10 32.5	31.2	9.352	+50.44	-1 29.56	15 56.50	1 5.40	2 0 47.56
22	2 3 2.63	2.36	12 30 37.2	35.8	9.370	49.93	1 41.46	15 56.25	1 5.47	2 4 44.11
23	2 6 47.73	47.43	12 50 29.6	28.0	9.389	49.41	1 52.91	15 56.00	1 5.54	2 8 40.66
24	2 10 33.29	32.97	13 10 9.1	7.4	9.408	48.88	2 3.91	15 55.75	1 5.61	2 12 37.22
25	2 14 19.34	18.99	13 29 35.7	33.9	9.428	48.33	2 14.43	15 55.50	1 5.68	2 16 33.77
26	2 18 5.87	5.50	+13 48 48.9	47.0	9.449	+47.77	-2 24.44	15 55.25	1 5.75	2 20 30.33
27	2 21 52.91	52.51	14 7 48.5	46.5	9.471	47.30	2 33.95	15 55.00	1 5.82	2 24 26.88
28	2 25 40.46	40.04	14 26 34.2	32.1	9.493	46.81	2 42.96	15 54.75	1 5.90	2 28 23.44
29	2 29 28.54	28.09	14 45 5.8	3.6	9.515	46.31	2 51.43	15 54.50	1 5.97	2 32 19.99
30	2 33 17.17	16.70	15 3 22.7	20.5	9.538	45.80	2 59.35	15 54.25	1 6.05	2 36 16.54
May 1	2 37 6.36	5.87	+15 21 24.9	22.7	9.561	+44.78	-3 6.72	15 54.01	1 6.13	2 40 13.09
2	2 40 56.11	55.60	15 39 12.0	9.7	9.585	44.14	3 13.52	15 53.78	1 6.21	2 44 9.65
3	2 44 46.42	45.89	15 56 43.6	41.3	9.608	43.49	3 19.76	15 53.55	1 6.29	2 48 6.20
4	2 48 37.31	36.76	16 13 59.5	57.2	9.632	42.83	3 25.43	15 53.32	1 6.37	2 52 2.76
5	2 52 28.78	28.21	16 30 59.4	57.0	9.656	42.15	3 30.52	15 53.09	1 6.45	2 55 59.31
6	2 56 20.82	20.24	+16 47 42.9	40.4	9.681	+41.46	-3 35.04	15 52.86	1 6.53	2 59 55.87
7	3 0 13.45	12.86	17 4 9.7	7.2	9.705	40.76	3 38.96	15 52.63	1 6.61	3 3 52.42
8	3 4 6.66	6.06	17 20 19.5	17.0	9.730	40.05	3 42.29	15 52.41	1 6.70	3 7 48.98
9	3 7 60.46	59.55	17 36 12.1	9.6	9.754	39.32	3 45.05	15 52.20	1 6.78	3 11 45.53
10	3 11 54.84	54.22	17 51 47.0	44.5	9.778	38.58	3 47.23	15 51.99	1 6.86	3 15 42.09
11	3 15 49.79	49.17	+18 7 4.1	1.6	9.802	+37.83	-3 48.84	15 51.78	1 6.94	3 19 38.64
12	3 19 45.32	44.69	18 22 2.9	0.5	9.825	37.07	3 49.87	15 51.57	1 7.03	3 23 35.20
13	3 23 41.41	40.78	18 36 43.2	40.8	9.849	36.30	3 50.34	15 51.37	1 7.11	3 27 31.75
14	3 27 38.05	37.42	18 51 4.7	2.4	9.873	35.50	3 50.25	15 51.18	1 7.19	3 31 28.31
15	3 31 35.25	34.62	19 5 7.1	4.8	9.895	34.70	3 49.61	15 50.99	1 7.27	3 35 24.87
16	3 35 33.00	32.37	+19 18 50.0	47.8	9.918	+33.88	-3 48.42	15 50.80	1 7.36	3 39 21.43
17	3 39 31.30	30.67	+19 32 13.2	11.1	9.941	+33.05	-3 46.68	15 50.62	1 7.44	3 43 17.98

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.18 from the sidereal interval.



## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>'</sup> <sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
May 17	3 39 31.30	30.67	+19 32 13.2	11.1	9.941	+33.05	-3 46.68	15 50.62	1 7.44	3 43 17.98
18	3 43 30.14	29.51	19 45 16.6	14.5	9.963	32.22	3 44.40	15 50.44	1 7.52	3 47 14.54
19	3 47 29.51	28.89	19 57 59.7	57.7	9.985	31.38	3 41.59	15 50.26	1 7.60	3 51 11.09
20	3 51 29.41	28.80	20 10 22.3	20.4	10.007	30.51	3 38.25	15 50.08	1 7.67	3 55 7.65
21	3 55 29.62	29.22	20 22 24.3	22.5	10.026	29.64	3 34.39	15 49.91	1 7.75	3 59 4.20
22	3 59 30.75	30.16	+20 34 5.2	3.5	10.049	+28.76	-3 30.02	15 49.74	1 7.82	4 3 0.76
23	4 3 32.19	31.61	20 45 25.0	23.4	10.070	27.87	3 25.14	15 49.58	1 7.89	4 6 57.31
24	4 7 34.13	33.57	20 56 23.4	21.9	10.091	26.98	3 19.76	15 49.42	1 7.96	4 10 53.87
25	4 11 36.56	36.01	21 6 60.1	58.7	10.112	26.08	3 13.88	15 49.26	1 8.03	4 14 50.43
26	4 15 39.48	38.95	21 17 15.1	13.7	10.132	25.16	3 7.51	15 49.10	1 8.10	4 18 46.99
27	4 19 42.89	42.38	+21 27 8.0	6.7	10.152	+24.24	-3 0.67	15 48.94	1 8.16	4 22 43.54
28	4 23 46.77	46.28	21 36 38.7	37.5	10.171	23.31	2 53.35	15 48.79	1 8.23	4 26 40.10
29	4 27 51.11	50.64	21 45 47.0	45.9	10.190	22.37	2 45.57	15 48.64	1 8.29	4 30 36.65
30	4 31 55.89	55.44	21 54 32.7	31.7	10.208	21.43	2 37.34	15 48.49	1 8.35	4 34 33.21
31	4 36 1.10	0.67	22 2 55.6	54.7	10.226	20.47	2 28.68	15 48.35	1 8.41	4 38 29.76
June 1	4 40 6.74	6.34	+22 10 55.6	54.8	10.244	+19.51	-2 19.60	15 48.21	1 8.46	4 42 26.33
2	4 44 12.78	12.41	22 18 32.4	31.7	10.260	18.54	2 10.12	15 48.07	1 8.51	4 46 22.88
3	4 48 19.21	18.87	22 25 45.9	45.3	10.276	17.57	2 0.24	15 47.94	1 8.56	4 50 19.44
4	4 52 26.03	25.72	22 32 36.0	35.4	10.291	16.59	1 49.98	15 47.81	1 8.61	4 54 15.99
5	4 56 33.19	32.91	22 39 2.5	2.0	10.305	15.61	1 39.37	15 47.69	1 8.66	4 58 12.55
6	5 0 40.67	40.42	+22 45 5.2	4.8	10.318	+14.69	-1 28.44	15 47.58	1 8.70	5 2 9.10
7	5 4 48.46	48.24	22 50 44.0	43.7	10.330	13.69	1 17.20	15 47.47	1 8.74	5 6 5.66
8	5 8 56.54	56.35	22 55 58.8	58.6	10.341	12.69	1 5.69	15 47.36	1 8.78	5 10 2.22
9	5 13 4.87	4.72	23 0 49.5	49.3	10.352	11.61	0 53.92	15 47.25	1 8.81	5 13 58.78
10	5 17 13.43	13.31	23 5 15.9	15.7	10.361	10.60	0 41.92	15 47.15	1 8.84	5 17 55.34
11	5 21 22.19	22.11	+23 9 17.9	17.8	10.369	+9.58	-0 29.72	15 47.06	1 8.87	5 21 51.90
12	5 25 31.13	31.08	23 12 55.4	55.4	10.376	8.56	0 17.33	15 46.97	1 8.89	5 25 48.46
13	5 29 40.23	40.22	23 16 8.4	8.4	10.382	7.53	-0 4.78	15 46.88	1 8.91	5 29 45.01
14	5 33 49.46	49.48	23 18 56.8	56.8	10.387	6.50	+0 7.80	15 46.81	1 8.93	5 33 41.57
15	5 37 58.78	58.84	23 21 20.5	20.5	10.391	5.47	0 20.66	15 46.74	1 8.94	5 37 38.13
16	5 42 8.19	8.29	+23 23 19.5	19.5	10.393	+4.44	+0 33.51	15 46.67	1 8.96	5 41 34.68
17	5 46 17.65	17.79	23 24 53.6	53.6	10.395	3.41	0 46.42	15 46.61	1 8.97	5 45 31.24
18	5 50 27.14	27.32	23 26 3.0	3.0	10.396	2.38	0 59.35	15 46.55	1 8.97	5 49 27.80
19	5 54 36.64	36.85	23 26 47.6	47.6	10.396	1.34	1 12.29	15 46.50	1 8.97	5 53 24.36
20	5 58 46.12	46.37	23 27 7.3	7.4	10.394	+0.30	1 25.22	15 46.45	1 8.97	5 57 20.91
21	6 2 55.58	55.67	+23 27 2.2	2.3	10.392	-0.74	+1 38.12	15 46.40	1 8.97	6 1 17.47
22	6 7 4.98	5.31	23 26 32.3	32.3	10.389	1.77	1 50.96	15 46.35	1 8.96	6 5 14.03
23	6 11 14.30	14.66	23 25 37.6	37.5	10.386	2.80	2 3.72	15 46.31	1 8.95	6 9 10.59
24	6 15 23.52	23.92	23 24 18.1	18.0	10.382	3.82	2 16.39	15 46.27	1 8.94	6 13 7.14
25	6 19 32.63	33.06	23 22 34.0	33.9	10.377	4.84	2 28.95	15 46.24	1 8.93	6 17 3.70
26	6 23 41.62	42.08	+23 20 25.3	25.1	10.371	-5.87	+2 41.39	15 46.21	1 8.91	6 21 0.26
27	6 27 50.47	50.97	23 17 52.0	51.7	10.365	6.89	2 53.68	15 46.19	1 8.88	6 24 56.82
28	6 31 59.15	59.69	23 14 54.2	53.8	10.358	7.91	3 5.80	15 46.17	1 8.85	6 28 53.37
29	6 36 7.63	8.21	23 11 31.9	31.4	10.350	8.93	3 17.73	15 46.15	1 8.82	6 32 49.93
30	6 40 15.90	16.51	23 7 45.3	44.7	10.341	9.94	3 29.45	15 46.13	1 8.79	6 36 46.49
31	6 44 23.94	24.58	+23 3 34.4	33.7	10.330	-10.95	+3 40.93	15 46.12	1 8.75	6 40 43.05
32	6 48 31.73	32.40	+22 58 59.4	58.6	10.319	-11.96	+3 52.16	15 46.11	1 8.71	6 44 39.60

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.19 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
	h m s	s	° ' "	"	s	"	m s	' "	m s	h m s
July 1	6 44 23.94	24.58	+23 3 34.4	33.7	10.330	-10.95	+3 40.93	15 46.12	1 8.75	6 40 43.05
2	6 48 31.73	32.40	22 58 59.4	58.6	10.319	11.96	3 52.16	15 46.11	1 8.71	6 44 39.60
3	6 52 39.25	39.95	22 53 60.3	59.4	10.307	12.96	4 3.12	15 46.11	1 8.67	6 48 36.16
4	6 56 46.48	47.21	22 48 37.3	36.3	10.294	13.95	4 13.79	15 46.11	1 8.62	6 52 32.71
5	7 0 53.39	54.14	22 42 50.5	49.4	10.281	14.94	4 24.14	15 46.11	1 8.57	6 56 29.27
6	7 4 59.95	60.73	+22 36 40.1	38.9	10.268	-15.92	+4 34.15	15 46.12	1 8.52	7 0 25.83
7	7 9 6.16	6.96	22 30 6.2	4.9	10.261	16.90	4 43.80	15 46.15	1 8.47	7 4 22.39
8	7 13 11.99	12.82	22 23 8.9	7.5	10.234	17.87	4 53.08	15 46.18	1 8.42	7 8 18.94
9	7 17 17.41	18.26	22 15 48.4	46.9	10.217	18.83	5 1.94	15 46.21	1 8.36	7 12 15.50
10	7 21 22.40	23.28	22 8 4.8	3.2	10.199	19.78	5 10.37	15 46.24	1 8.30	7 16 12.06
11	7 25 26.94	27.84	+21 59 58.4	56.6	10.180	-20.73	+5 18.35	15 46.28	1 8.24	7 20 8.62
12	7 29 31.01	31.93	21 51 29.4	27.5	10.160	21.67	5 25.86	15 46.33	1 8.18	7 24 5.18
13	7 33 34.61	35.55	21 42 38.0	36.0	10.140	22.61	5 32.90	15 46.38	1 8.11	7 28 1.74
14	7 37 37.70	38.66	21 33 24.3	22.2	10.118	23.53	5 39.43	15 46.44	1 8.04	7 31 58.29
15	7 41 40.28	41.25	21 23 48.5	46.3	10.096	24.44	5 45.45	15 46.50	1 7.97	7 35 54.86
16	7 45 42.32	43.30	+21 13 51.1	48.7	10.074	-25.34	+5 50.94	15 46.56	1 7.90	7 39 51.40
17	7 49 43.82	44.81	21 3 32.0	29.5	10.051	26.24	5 55.88	15 46.63	1 7.82	7 43 47.96
18	7 53 44.77	45.77	20 52 51.4	48.8	10.028	27.12	6 0.27	15 46.71	1 7.74	7 47 44.51
19	7 57 45.16	46.16	20 41 49.8	47.0	10.004	28.00	6 4.10	15 46.79	1 7.66	7 51 41.07
20	8 1 44.98	45.99	20 30 27.4	24.5	9.982	28.86	6 7.37	15 46.87	1 7.58	7 55 37.62
21	8 5 44.23	45.25	+20 18 44.3	41.3	9.957	-29.72	+6 10.07	15 46.96	1 7.50	7 59 34.18
22	8 9 42.90	43.93	20 6 40.8	37.7	9.933	30.56	6 12.18	15 47.05	1 7.42	8 3 30.74
23	8 13 40.99	42.02	19 54 17.1	13.9	9.909	31.40	6 13.70	15 47.14	1 7.34	8 7 27.30
24	8 17 38.49	39.52	19 41 33.6	30.3	9.885	32.22	6 14.65	15 47.23	1 7.26	8 11 23.85
25	8 21 35.41	36.44	19 28 30.4	27.0	9.860	33.03	6 15.02	15 47.33	1 7.17	8 15 20.41
26	8 25 31.75	32.78	+19 15 7.9	4.4	9.836	-33.83	+6 14.80	15 47.43	1 7.09	8 19 16.96
27	8 29 27.51	28.53	19 1 26.3	22.7	9.811	34.62	6 13.99	15 47.53	1 7.00	8 23 13.52
28	8 33 22.69	23.70	18 47 25.8	22.1	9.787	35.41	6 12.60	15 47.64	1 6.92	8 27 10.07
29	8 37 17.27	18.28	18 33 6.6	2.9	9.763	36.18	6 10.64	15 47.75	1 6.83	8 31 6.63
30	8 41 11.27	12.27	18 18 29.1	25.4	9.739	36.93	6 8.09	15 47.87	1 6.74	8 35 3.18
31	8 45 4.69	5.68	+18 3 33.7	29.9	9.714	-37.68	+6 4.95	15 47.99	1 6.65	8 38 59.74
Aug. 1	8 48 57.52	58.50	17 48 20.5	16.7	9.690	38.41	6 1.22	15 48.11	1 6.57	8 42 56.29
2	8 52 49.76	50.73	17 32 40.8	45.9	9.665	39.13	5 56.90	15 48.24	1 6.48	8 46 52.85
3	8 56 41.42	42.37	17 16 61.9	58.0	9.641	39.84	5 52.00	15 48.37	1 6.39	8 50 49.40
4	9 0 32.49	33.42	17 0 57.1	53.2	9.616	40.54	5 46.51	15 48.50	1 6.30	8 54 45.96
5	9 4 22.97	23.88	+16 44 35.8	31.9	9.592	-41.22	+5 40.44	15 48.64	1 6.21	8 58 42.51
6	9 8 12.86	13.75	16 27 58.2	54.3	9.567	41.89	5 33.77	15 48.79	1 6.13	9 2 39.07
7	9 12 2.17	3.04	16 11 4.6	0.7	9.543	42.56	5 26.52	15 48.94	1 6.04	9 6 35.62
8	9 15 50.90	51.75	15 53 55.4	51.6	9.518	43.21	5 18.69	15 49.09	1 5.96	9 10 32.18
9	9 19 39.04	39.87	15 36 30.9	27.1	9.494	43.84	5 10.27	15 49.26	1 5.87	9 14 28.73
10	9 23 26.60	27.40	+15 18 51.3	47.5	9.470	-44.46	+5 1.27	15 49.43	1 5.79	9 18 25.29
11	9 27 13.58	14.35	15 0 56.9	53.2	9.446	45.07	4 51.70	15 49.60	1 5.71	9 22 21.84
12	9 30 59.99	60.72	14 42 48.3	44.7	9.422	45.65	4 41.56	15 49.77	1 5.63	9 26 18.40
13	9 34 45.83	46.53	14 24 25.6	22.1	9.398	46.23	4 30.85	15 49.95	1 5.55	9 30 14.95
14	9 38 31.11	31.78	14 5 49.2	45.8	9.375	46.80	4 19.58	15 50.13	1 5.47	9 34 11.51
15	9 42 15.84	16.48	+13 46 59.4	56.1	9.352	-47.35	+4 7.75	15 50.31	1 5.40	9 38 8.06
16	9 46 0.04	0.65	+13 27 56.5	53.3	9.330	-47.88	+3 55.39	15 50.50	1 5.33	9 42 4.62

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.19 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
Aug. 16	h m s 9 46 0.04	s 0.65	+13 27 56.5	53.3	9.330	-47.98	+ 3 55.39	15 50.50	m s 1 5.33	h m s 9 42 4.62
17	9 49 43.71	44.29	13 8 40.8	37.7	9.309	48.41	3 42.50	15 50.69	1 5.26	9 46 1.17
18	9 53 26.86	27.40	12 49 12.7	9.8	9.288	48.93	3 29.10	15 50.89	1 5.19	9 49 57.73
19	9 57 9.51	10.01	12 29 32.5	29.7	9.267	49.49	3 15.20	15 51.09	1 5.12	9 53 54.28
20	10 0 51.68	52.14	12 9 40.4	37.8	9.247	49.91	3 0.82	15 51.29	1 5.05	9 57 50.83
21	10 4 33.38	33.80	+11 49 36.7	34.3	9.228	-50.38	+ 2 45.97	15 51.49	1 4.98	10 1 47.38
22	10 8 14.62	15.00	11 29 21.9	19.7	9.209	50.84	2 30.66	15 51.69	1 4.92	10 5 43.94
23	10 11 55.43	55.77	11 8 56.1	54.1	9.191	51.32	2 14.92	15 51.89	1 4.85	10 9 40.49
24	10 15 35.84	36.14	10 48 19.7	17.9	9.175	51.73	1 58.77	15 52.10	1 4.79	10 13 37.05
25	10 19 15.84	16.10	10 27 33.0	31.4	9.159	52.16	1 42.21	15 52.31	1 4.73	10 17 33.60
26	10 22 55.45	55.67	+10 6 36.3	34.9	9.143	-52.57	+ 1 25.27	15 52.52	1 4.67	10 21 30.16
27	10 26 34.71	34.88	9 45 29.8	29.7	9.128	52.96	1 7.98	15 52.74	1 4.61	10 25 26.71
28	10 30 13.62	13.76	9 24 14.0	13.2	9.114	53.35	0 50.35	15 52.96	1 4.56	10 29 23.26
29	10 33 52.20	52.29	9 2 49.1	48.5	9.101	53.79	0 32.38	15 53.18	1 4.51	10 33 19.81
30	10 37 30.47	30.51	8 41 15.4	15.1	9.088	54.08	+ 0 14.10	15 53.40	1 4.46	10 37 16.37
31	10 41 8.44	8.43	+ 8 19 33.3	33.3	9.076	-54.48	- 0 4.48	15 53.62	1 4.41	10 41 12.92
Sept. 1	10 44 46.13	46.08	7 57 43.0	43.4	9.065	54.76	0 23.34	15 53.85	1 4.37	10 45 9.47
2	10 48 23.55	23.45	7 35 44.9	45.6	9.054	55.07	0 42.47	15 54.08	1 4.33	10 49 6.02
3	10 52 0.72	0.57	7 13 39.3	40.3	9.044	55.38	1 1.85	15 54.32	1 4.29	10 53 2.58
4	10 55 37.65	37.45	6 51 26.6	27.9	9.034	55.67	1 21.47	15 54.55	1 4.25	10 56 59.13
5	10 59 14.35	14.10	+ 6 29 7.1	8.7	9.025	-55.96	- 1 41.31	15 54.79	1 4.22	11 0 55.69
6	11 2 50.85	50.55	6 6 41.1	43.0	9.016	56.21	2 1.37	15 55.03	1 4.19	11 4 52.24
7	11 6 27.15	26.80	5 44 9.1	11.3	9.009	56.46	2 21.62	15 55.28	1 4.17	11 8 48.79
8	11 10 3.26	2.86	5 21 31.3	33.8	9.002	56.69	2 42.04	15 55.53	1 4.15	11 12 45.34
9	11 13 39.22	38.76	4 58 48.1	50.9	8.995	56.90	3 2.64	15 55.79	1 4.13	11 16 41.90
10	11 17 15.03	14.52	+ 4 35 59.8	63.0	8.989	-57.11	- 3 23.38	15 56.05	1 4.11	11 20 38.45
11	11 20 50.70	50.14	4 13 6.8	10.4	8.984	57.30	3 44.25	15 56.31	1 4.10	11 24 35.00
12	11 24 26.26	25.65	3 50 9.4	13.3	8.980	57.47	4 5.23	15 56.57	1 4.08	11 28 31.55
13	11 28 1.73	1.07	3 27 7.9	12.2	8.976	57.63	4 26.31	15 56.83	1 4.07	11 32 28.10
14	11 31 37.11	36.40	3 4 2.8	7.4	8.974	57.78	4 47.48	15 57.09	1 4.06	11 36 24.65
15	11 35 12.44	11.68	+ 2 40 54.3	59.3	8.979	-57.99	- 5 8.70	15 57.36	1 4.06	11 40 21.21
16	11 38 47.74	46.93	2 17 42.8	48.1	8.971	58.03	5 29.95	15 57.63	1 4.06	11 44 17.76
17	11 42 23.03	22.16	1 54 28.6	34.2	8.970	58.14	5 51.20	15 57.90	1 4.06	11 48 14.32
18	11 45 58.33	57.41	1 31 12.0	18.0	8.971	58.24	6 12.44	15 58.17	1 4.06	11 52 10.87
19	11 49 33.67	32.89	1 7 53.4	59.8	8.974	58.31	6 33.65	15 58.44	1 4.07	11 56 7.42
20	11 53 9.06	8.03	+ 0 44 33.0	39.8	8.977	-58.38	- 6 54.80	15 58.71	1 4.08	12 0 3.97
21	11 56 44.54	43.46	+ 0 21 11.2	19.3	8.981	58.43	7 15.87	15 58.98	1 4.09	12 4 0.52
22	12 0 20.13	19.00	- 0 2 11.7	4.3	8.986	58.47	7 36.84	15 59.25	1 4.11	12 7 57.07
23	12 3 55.85	54.67	0 25 35.4	27.6	8.992	58.49	7 57.67	15 59.52	1 4.13	12 11 53.63
24	12 7 31.73	30.49	0 48 59.5	51.4	8.999	58.51	8 18.34	15 59.79	1 4.15	12 15 50.18
25	12 11 7.78	6.48	- 1 12 23.7	15.2	9.007	-58.51	- 8 38.84	16 0.06	1 4.18	12 19 46.74
26	12 14 44.03	42.68	1 35 47.8	38.9	9.016	58.49	8 59.13	16 0.33	1 4.21	12 23 43.29
27	12 18 20.51	19.10	1 59 11.3	2.1	9.025	58.46	9 19.20	16 0.60	1 4.25	12 27 39.84
28	12 21 57.24	55.78	2 22 34.0	24.5	9.036	58.43	9 39.03	16 0.87	1 4.28	12 31 36.39
29	12 25 34.23	32.72	2 45 55.4	45.6	9.048	58.36	9 58.59	16 1.14	1 4.32	12 35 32.94
30	12 29 11.50	9.94	- 3 9 15.3	5.2	9.060	-58.39	-10 17.86	16 1.41	1 4.36	12 39 29.49
31	12 32 49.08	47.47	- 3 32 33.3	22.9	9.073	-58.20	-10 36.83	16 1.68	1 4.40	12 43 26.05

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
Oct.	h m s	s	° ' "	"	s	"	m s	' "	m s	h m s
1	12 32 49.08	47.47	- 3 32 33.3	22.9	9.073	-58.90	-10 36.83	16 1.68	1 4.40	12 43 26.05
2	12 36 26.98	25.32	3 55 49.0	38.4	9.087	58.10	10 55.48	16 1.95	1 4.44	12 47 22.60
3	12 40 5.21	3.50	4 18 62.1	51.3	9.101	57.98	11 13.79	16 2.23	1 4.49	12 51 19.15
4	12 43 43.80	42.04	4 42 12.1	1.1	9.116	57.85	11 31.75	16 2.50	1 4.54	12 55 15.70
5	12 47 22.76	20.96	5 5 18.6	7.3	9.131	57.70	11 49.35	16 2.78	1 4.60	12 59 12.26
6	12 51 2.11	0.26	- 5 28 21.4	9.8	9.146	-57.53	-12 6.56	16 3.06	1 4.66	13 3 8.81
7	12 54 41.86	39.96	5 51 20.1	8.2	9.165	57.35	12 23.36	16 3.34	1 4.72	13 7 5.36
8	12 58 22.02	20.08	6 14 14.0	2.0	9.183	57.15	12 39.75	16 3.62	1 4.79	13 11 1.91
9	13 2 2.62	0.64	6 36 63.0	50.7	9.201	56.94	12 55.70	16 3.90	1 4.86	13 14 58.47
10	13 5 43.68	41.65	6 59 46.7	34.2	9.220	56.70	13 11.19	16 4.18	1 4.92	13 18 55.02
11	13 9 25.21	23.14	- 7 22 24.6	12.0	9.240	-56.45	-13 26.21	16 4.47	1 5.00	13 22 51.57
12	13 13 7.23	5.12	7 44 56.4	43.6	9.261	56.19	13 40.75	16 4.75	1 5.08	13 26 48.12
13	13 16 49.75	47.60	8 7 21.6	8.7	9.283	55.91	13 54.79	16 5.03	1 5.16	13 30 44.68
14	13 20 32.79	30.60	8 29 39.9	26.8	9.305	55.61	14 8.31	16 5.31	1 5.24	13 34 41.23
15	13 24 16.37	14.14	8 51 50.9	37.7	9.328	55.30	14 21.29	16 5.60	1 5.32	13 38 37.79
16	13 27 60.51	58.24	- 9 13 54.3	41.0	9.350	-54.97	-14 33.70	16 5.88	1 5.40	13 42 34.34
17	13 31 45.24	42.94	9 35 49.6	36.2	9.376	54.69	14 45.53	16 6.15	1 5.49	13 46 30.89
18	13 35 30.57	28.23	9 57 36.5	23.0	9.402	54.37	14 56.76	16 6.43	1 5.58	13 50 27.44
19	13 39 16.52	14.15	10 19 14.5	0.9	9.428	53.90	15 7.36	16 6.70	1 5.67	13 54 24.00
20	13 43 3.12	0.72	10 40 43.4	29.7	9.455	53.50	15 17.32	16 6.97	1 5.77	13 58 20.55
21	13 46 50.37	47.94	-11 1 62.8	49.1	9.483	-53.10	-15 26.63	16 7.24	1 5.87	14 2 17.10
22	13 50 38.30	35.84	11 22 72.2	58.5	9.512	52.68	15 35.26	16 7.51	1 5.97	14 6 13.65
23	13 54 26.94	24.46	11 43 71.4	57.7	9.541	52.24	15 43.19	16 7.77	1 6.07	14 10 10.21
24	13 58 16.29	13.79	12 4 59.9	40.3	9.570	51.79	15 50.40	16 8.03	1 6.17	14 14 6.76
25	14 2 6.38	3.85	12 25 37.4	23.8	9.603	51.33	15 56.87	16 8.29	1 6.28	14 18 3.32
26	14 5 57.22	54.66	-12 45 63.5	49.9	9.634	-50.84	-16 2.60	16 8.54	1 6.38	14 21 59.87
27	14 9 48.81	46.23	13 6 17.7	4.2	9.666	50.34	16 7.57	16 8.79	1 6.49	14 25 56.43
28	14 13 41.18	38.58	13 26 19.7	6.3	9.699	49.82	16 11.76	16 9.04	1 6.60	14 29 52.98
29	14 17 34.34	31.72	13 45 69.1	55.8	9.732	49.28	16 15.16	16 9.29	1 6.71	14 33 49.54
30	14 21 28.29	25.65	14 5 45.5	32.3	9.765	48.73	16 17.77	16 9.54	1 6.82	14 37 46.09
31	14 25 23.05	20.30	-14 24 68.5	55.4	9.799	-48.17	-16 19.58	16 9.78	1 6.93	14 41 42.64
Nov.	1 14 29 19.62	15.95	14 44 17.6	4.6	9.832	47.59	16 20.57	16 10.03	1 7.05	14 45 39.19
	2 14 33 15.00	12.32	15 2 72.4	59.6	9.866	46.99	16 20.75	16 10.27	1 7.17	14 49 35.75
	3 14 37 12.20	9.51	15 21 52.5	39.8	9.900	46.36	16 20.11	16 10.51	1 7.29	14 53 32.30
	4 14 41 10.23	7.53	15 40 17.4	4.9	9.935	45.71	16 18.64	16 10.75	1 7.41	14 57 28.86
	5 14 45 9.09	6.39	-15 58 26.8	14.5	9.969	-45.06	-16 16.35	16 10.99	1 7.52	15 1 25.41
	6 14 49 8.78	6.08	16 16 20.1	8.0	10.004	44.38	16 13.23	16 11.23	1 7.64	15 5 21.97
	7 14 53 9.30	6.60	16 33 57.0	45.1	10.038	43.68	16 9.27	16 11.47	1 7.76	15 9 18.52
	8 14 57 10.64	7.95	16 51 17.1	5.5	10.073	42.96	16 4.49	16 11.71	1 7.88	15 13 15.08
	9 15 1 12.82	10.13	17 8 20.0	8.6	10.107	42.25	15 58.88	16 11.95	1 8.00	15 17 11.63
	10 15 5 15.82	13.14	-17 24 65.2	54.1	10.142	-41.51	-15 52.44	16 12.18	1 8.12	15 21 8.19
	11 15 9 19.65	16.98	17 41 32.3	21.5	10.177	40.74	15 45.17	16 12.41	1 8.24	15 25 4.74
	12 15 13 24.33	21.67	17 57 40.8	30.4	10.212	39.96	15 37.06	16 12.63	1 8.36	15 29 1.30
	13 15 17 29.83	27.19	18 13 30.4	20.4	10.246	39.17	15 28.12	16 12.85	1 8.48	15 32 57.85
	14 15 21 36.16	33.54	18 28 60.9	51.1	10.281	38.35	15 18.36	16 13.07	1 8.60	15 36 54.41
	15 15 25 43.31	40.71	-18 44 11.7	2.2	10.315	-37.53	-15 7.77	16 13.28	1 8.72	15 40 50.97
	16 15 29 51.29	48.72	-18 58 62.4	53.3	10.350	-36.69	-14 56.35	16 13.49	1 8.84	15 44 47.52

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.18 from the sidereal interval.

## FOR WASHINGTON MEAN AND APPARENT NOON.

Date.	Apparent Right Ascension.		Apparent Declination.		Hourly Motion.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. Passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	App. Noon.	Mean Noon.	App. Noon.	Right Ascen.	Declination.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>'</sup> <sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Nov. 16	15 29 51.29	48.72	-18 58 62.4	53.3	10.350	-36.69	-14 56.35	16 13.49	1 8.84	15 44 47.52
17	15 33 60.10	57.56	19 13 32.7	23.9	10.364	35.83	14 44.10	16 13.70	1 8.95	15 48 44.07
18	15 38 9.74	7.23	19 27 42.2	33.8	10.419	34.96	14 31.02	16 13.90	1 9.06	15 52 40.63
19	15 42 20.20	17.72	19 41 30.7	22.6	10.453	34.07	14 17.13	16 14.10	1 9.17	15 56 37.18
20	15 46 31.47	29.02	19 54 57.8	50.0	10.487	33.16	14 2.42	16 14.29	1 9.28	16 0 33.74
21	15 50 43.55	41.14	-20 7 63.0	55.6	10.521	-32.25	-13 46.90	16 14.48	1 9.39	16 4 30.29
22	15 54 56.44	54.07	20 20 46.0	39.0	10.534	31.32	13 30.57	16 14.66	1 9.50	16 8 26.85
23	15 59 10.12	7.79	20 33 6.6	0.0	10.587	30.38	13 13.44	16 14.84	1 9.61	16 12 23.41
24	16 3 24.59	22.30	20 44 64.4	58.1	10.620	29.42	12 55.53	16 15.01	1 9.72	16 16 19.97
25	16 7 39.83	37.59	20 56 39.0	33.0	10.652	28.45	12 36.85	16 15.17	1 9.82	16 20 16.52
26	16 11 55.83	53.64	-21 7 50.1	44.5	10.689	-27.47	-12 17.41	16 15.33	1 9.92	16 24 13.08
27	16 16 12.58	10.44	21 18 37.4	32.1	10.712	26.48	11 57.22	16 15.49	1 10.01	16 28 9.64
28	16 20 30.04	27.96	21 28 60.6	55.7	10.742	25.47	11 36.32	16 15.65	1 10.11	16 32 6.20
29	16 24 48.21	46.19	21 38 59.4	54.8	10.771	24.44	11 14.71	16 15.81	1 10.20	16 36 2.75
30	16 29 7.06	5.10	21 48 33.4	29.2	10.799	23.40	10 52.42	16 15.96	1 10.29	16 39 59.31
Dec. 1	16 33 26.57	24.67	-21 57 42.4	38.5	10.826	-22.35	-10 29.47	16 16.11	1 10.38	16 43 55.87
2	16 37 46.71	44.88	22 6 26.0	22.5	10.851	21.29	10 5.89	16 16.25	1 10.46	16 47 52.43
3	16 42 7.45	5.69	22 14 44.0	40.8	10.875	20.21	9 41.70	16 16.39	1 10.53	16 51 48.98
4	16 46 28.77	27.08	22 22 36.2	33.3	10.899	19.13	9 16.93	16 16.53	1 10.60	16 55 45.54
5	16 50 50.63	49.02	22 29 62.2	59.6	10.921	18.05	8 51.61	16 16.66	1 10.68	16 59 42.09
6	16 55 13.02	11.48	-22 36 61.8	59.5	10.942	-16.95	- 8 25.78	16 16.79	1 10.75	17 3 38.65
7	16 59 35.88	34.41	22 43 34.8	32.7	10.969	15.83	7 59.48	16 16.92	1 10.82	17 7 35.21
8	17 3 59.19	57.80	22 49 40.9	39.0	10.981	14 71	7 32.72	16 17.04	1 10.88	17 11 31.77
9	17 8 22.94	21.63	22 55 19.9	18.3	10.997	13.58	7 5.53	16 17.16	1 10.94	17 15 28.32
10	17 12 47.07	45.84	23 0 31.7	30.3	11.013	12.43	6 37.94	16 17.27	1 11.00	17 19 24.88
11	17 17 11.56	10.41	-23 5 16.1	14.9	11.028	-11.28	- 6 10.00	16 17.38	1 11.05	17 23 21.44
12	17 21 36.38	35.32	23 9 33.1	32.1	11.041	10.13	5 41.73	16 17.49	1 11.10	17 27 18.00
13	17 26 1.51	0.54	23 13 22.3	21.5	11.059	8.98	5 13.15	16 17.59	1 11.14	17 31 14.56
14	17 30 26.91	26.03	23 16 43.6	43.0	11.063	7.89	4 44.30	16 17.69	1 11.18	17 35 11.12
15	17 34 52.55	51.76	23 19 37.1	36.6	11.073	6.65	4 15.21	16 17.78	1 11.21	17 39 7.67
16	17 39 18.39	17.69	-23 22 2.6	2.2	11.080	- 5.48	- 3 45.92	16 17.86	1 11.23	17 43 4.23
17	17 43 44.41	43.80	23 23 59.9	59.6	11.087	4.31	3 16.44	16 17.93	1 11.25	17 47 0.78
18	17 48 10.59	10.07	23 25 29.1	28.9	11.093	3.13	2 46.81	16 18.00	1 11.27	17 50 57.34
19	17 52 36.89	36.46	23 26 30.1	29.9	11.098	1.96	2 17.06	16 18.07	1 11.28	17 54 53.90
20	17 57 3.28	2.94	23 27 2.8	2.7	11.101	- 0.78	1 47.22	16 18.13	1 11.29	17 58 50.46
21	18 1 29.73	29.48	-23 27 7.3	7.3	11.103	+ 0.40	- 1 17.32	16 18.18	1 11.30	18 2 47.02
22	18 5 56.23	56.07	23 26 43.6	43.6	11.104	1.58	0 47.37	16 18.23	1 11.30	18 6 43.58
23	18 10 22.72	22.65	23 25 51.6	51.6	11.104	2.75	- 0 17.42	16 18.27	1 11.30	18 10 40.13
24	18 14 49.18	49.20	23 24 31.3	31.3	11.109	3.93	+ 0 12.50	16 18.30	1 11.29	18 14 36.69
25	18 19 15.57	15.68	23 22 42.8	42.8	11.098	5.10	0 42.34	16 18.33	1 11.28	18 18 33.25
26	18 23 41.86	42.07	-23 20 26.1	26.0	11.093	+ 6.28	+ 1 12.08	16 18.35	1 11.26	18 22 29.81
27	18 28 8.03	8.33	23 17 41.3	41.1	11.087	7.45	1 41.70	16 18.37	1 11.23	18 26 26.36
28	18 32 34.03	34.42	23 14 28.5	28.2	11.079	8.61	2 11.16	16 18.38	1 11.20	18 30 22.92
29	18 36 59.83	60.31	23 10 47.7	47.3	11.070	9.77	2 40.40	16 18.39	1 11.17	18 34 19.48
30	18 41 25.38	25.95	23 6 39.0	38.5	11.059	10.93	3 9.40	16 18.40	1 11.14	18 38 16.04
31	18 45 50.66	51.32	-23 2 2.6	2.0	11.047	+12.08	+ 3 38.14	16 18.40	1 11.10	18 42 12.59
32	18 50 15.64	16.39	-22 56 58.6	57.8	11.033	+13.24	+ 4 6.57	16 18.40	1 11.05	18 46 9.15

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0°.19 from the sidereal interval.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Jan. 1	14 36.60	2.217	9 22 10.48	143.26	+16 10 58.4	-465.9	68.48	15 48.8	57 55.6	II. S.
2	15 29.24	2.168	10 18 53.80	140.30	12 36 52.7	-509.1	67.81	15 55.4	58 19.8	II. S.
3	16 20.73	2.125	11 14 28.16	137.71	8 16 43.1	-605.9	67.22	16 1.0	58 40.3	II. S.
4	17 11.42	2.104	12 9 14.08	136.41	+ 3 26 4 2	-750.9	66.93	16 5.5	58 57.0	II. S.
5	18 1.95	2.113	13 3 50.62	136.98	- 1 38 21.5	-763.8	67.09	16 9.0	59 9.9	II. S.
6	18 53.10	2.156	13 59 5.11	139.55	- 6 39 5.3	-732.2	67.71	16 11.4	59 18.5	II. S.
7	19 45.64	2.226	14 55 42.27	143.76	-11 17 51.1	-653.8	68.74	16 12.2	59 21.6	II. S.
8	20 40.03	2.307	15 54 11.57	148.69	-15 15 53.3	-598.7	69.89	16 11.2	59 18.0	II. S.
9	21 36.31	2.377	16 54 33.73	152.90	-18 15 15.4	-561.9	70.84	16 8.0	59 6.2	II. S.
10	22 33.83	2.407	17 56 11.38	154.73	-20 1 33.7	-166.1	71.22	16 2.4	58 45.6	II. S.
11	23 31.42	2.381	18 57 52.78	153.11	-20 27 13.7	+ 37.5	70.80	15 54.5	58 16.5	
13	0 27.67	2.298	19 58 13.14	148.69	-19 33 36.6	226.8	69.56	15 44.3	57 40.2	
14	1 21.41	2.177	20 56 2.86	140.81	-17 30 16.8	384.0	67.81	15 33.5	56 59.5	I. S.
15	2 12.05	2.044	21 50 46.71	132.86	-14 31 49.9	501.7	65.85	15 22.1	56 17.6	I. S.
16	2 59.63	1.994	22 42 25.67	125.59	-10 54 8.1	580.7	64.03	15 11.3	55 37.9	I. S.
17	3 44.60	1.829	23 31 27.51	119.87	- 6 51 46.3	+626.1	62.57	15 1.9	55 3.3	I. S.
18	4 27.67	1.767	0 18 35.53	116.14	- 2 36 58.5	643.7	61.63	14 54.6	54 36.5	I. S.
19	5 9.68	1.740	1 4 39.96	114.59	+ 1 40 13.5	638.8	61.24	14 49.9	54 19.3	I. S.
20	5 51.51	1.750	1 50 32.61	115.18	5 51 16.5	613.3	61.43	14 46.2	54 12.9	I. S.
21	6 33.98	1.794	2 37 4.82	117.85	9 48 7.8	567.5	62.15	14 49.5	54 17.9	I. S.
22	7 17.90	1.870	3 25 3.88	122.37	+13 22 20.3	+499.4	63.33	14 53.8	54 33.6	I. S.
23	8 3.93	1.969	4 15 9.56	128.30	16 24 19.5	405.8	64.83	15 1.0	54 59.8	I. S.
24	8 52.49	2.079	5 7 47.78	134.92	18 43 10.8	283.4	66.48	15 10.4	55 34.4	I. S.
25	9 43.66	2.182	6 3 2.83	141.17	20 7 12.8	+132.1	67.98	15 21.4	56 15.0	I. S.
26	10 37.04	2.260	7 0 31.38	145.65	20 25 40.2	- 43.0	69.08	15 33.3	56 58.6	I. S.
27	11 31.83	2.297	7 59 24.07	148.09	+19 31 18.8	-229.5	69.59	15 45.0	57 41.5	I. N.
28	12 26.98	2.291	8 58 38.35	147.73	17 22 59.7	-409.8	69.49	15 55.5	58 20.3	I. S.
29	13 21.55	2.253	9 57 18.62	145.43	14 6 53.1	-565.7	68.95	16 4.1	58 51.8	II. S.
30	14 15.04	2.204	10 54 53.05	142.44	9 55 43.2	-692.9	68.26	16 10.1	59 13.9	II. S.
31	15 7.39	2.162	11 51 19.23	139.91	+ 5 6 38.7	-754.2	67.69	16 13.5	59 26.3	II. S.
Feb. 1	15 58.99	2.143	12 46 59.91	138.74	- 0 1 8.8	-776.5	67.46	16 14.3	59 29.3	II. S.
2	16 50.45	2.152	13 42 32.88	139.31	- 5 8 10.1	-750.7	67.65	16 13.0	59 24.5	II. S.
3	17 42.48	2.189	14 38 39.72	141.52	- 9 55 33.5	-678.9	68.23	16 10.0	59 13.5	II. S.
4	18 35.64	2.244	15 35 54.46	144.83	-14 5 31.4	-564.2	69.05	16 5.8	58 57.8	II. S.
5	19 30.18	2.296	16 34 32.16	148.22	-17 21 57.0	-412.2	69.85	16 0.5	58 38.5	II. S.
6	20 25.87	2.336	17 34 19.49	150.41	-19 31 37.5	-232.4	70.33	15 54.4	58 16.1	II. S.
7	21 22.00	2.333	18 34 32.95	150.26	-20 26 8.3	- 39.2	70.22	15 47.5	57 50.9	II. N.
8	22 17.50	2.283	19 34 8.91	147.98	-20 3 39.5	+149.4	69.43	15 39.8	57 22.7	II. N.
9	23 11.30	2.195	20 32 3.41	141.94	-18 29 24.5	317.0	68.06	15 31.6	56 52.2	
11	0 2.70	2.085	21 27 31.46	135.29	-15 54 19.2	452.3	66.37	15 22.8	56 20.1	
12	0 51.38	1.973	22 20 16.70	128.55	-12 32 27.4	+550.8	64.65	15 14.0	55 47.7	I. S.
13	1 37.52	1.876	23 10 29.28	122.71	- 8 38 27.5	613.6	63.15	15 5.6	55 16.9	I. S.
14	2 21.61	1.803	23 58 38.10	118.32	- 4 25 52.2	644.6	62.03	14 58.2	54 49.6	I. S.
15	3 4.30	1.760	0 45 22.99	115.74	- 0 6 25.3	648.6	61.40	14 52.3	54 28.0	I. S.
16	3 46.33	1.749	1 31 28.71	115.06	+ 4 9 51.6	+629.2	61.28	14 48.5	54 13.9	I. S.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi- diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Feb. 16	3 46.33	1.749	1 31 28.71	115.06	+ 4 9 51.6	+629.2	61.28	14 48.5	54 13.9	I. S.
17	4 28.49	1.770	2 17 41.42	116.31	8 14 10.0	588.8	61.69	14 47.1	54 8.9	I. S.
18	5 11.51	1.821	3 4 46.25	119.38	11 58 9.4	527.8	62.56	14 48.6	54 14.5	I. S.
19	5 56.08	1.898	3 53 24.41	124.03	15 13 15.0	444.1	63.83	14 53.1	54 30.9	I. S.
20	6 42.75	1.994	4 44 9.23	129.84	17 50 5.0	335.9	65.34	15 0.6	54 58.4	I. S.
21	7 31.86	2.098	5 37 20.37	136.09	+19 38 23.5	+201.0	66.91	15 10.8	55 36.1	I. S.
22	8 23.40	2.193	6 32 57.36	141.81	20 27 39.1	+ 41.3	68.29	15 23.4	56 22.4	I. N.
23	9 16.96	2.263	7 30 36.02	146.07	20 8 43.4	-138.2	69.27	15 37.5	57 14.2	I. N.
24	10 11.79	2.298	8 29 31.72	148.19	18 36 4.0	-394.7	69.73	15 52.1	58 7.7	I. N.
25	11 7.03	2.299	9 28 52.17	148.20	15 50 12.7	-501.0	69.68	16 5.8	58 57.9	I. N.
26	12 1.97	2.276	10 27 53.86	146.78	+11 58 57.3	-648.9	69.31	16 17.2	59 39.8	I. N.
27	12 56.23	2.246	11 26 14.84	144.99	7 16 48.0	-752.5	68.88	16 25.1	60 8.9	II. S.
28	13 49.85	2.225	12 23 57.57	143.73	+ 2 4 7.5	-802.4	68.60	16 28.9	60 22.9	II. S.
29	14 43.19	2.224	13 21 23.46	143.65	- 3 17 12.8	-794.9	68.63	16 28.4	60 20.9	II. S.
Mar. 1	15 36.75	2.243	14 19 2.41	144.81	- 8 26 58.0	-731.7	69.00	16 24.1	60 5.3	II. S.
2	16 30.97	2.277	15 17 21.09	146.86	-12 56 7.1	-619.4	69.55	16 17.0	59 38.9	II. S.
3	17 26.06	2.312	16 16 31.74	148.97	-16 34 40.1	-467.4	70.11	16 7.9	59 5.8	II. S.
4	18 21.83	2.331	17 16 23.77	150.13	-19 6 23.5	-287.7	70.40	15 57.9	58 28.8	II. S.
5	19 17.71	2.318	18 16 22.26	149.39	-20 23 13.5	- 95.7	70.19	15 47.6	57 51.3	II. N.
6	20 12.84	2.269	19 15 35.82	146.38	-20 23 25.7	+ 92.7	69.40	15 37.7	57 14.9	II. N.
7	21 6.36	2.187	20 13 12.18	141.40	-19 11 25.7	+263.2	68.11	15 28.4	56 40.5	II. N.
8	21 57.64	2.085	21 8 33.60	135.29	-16 56 33.3	405.9	66.50	15 19.6	56 8.4	II. N.
9	22 46.41	1.981	22 1 24.96	129.04	-13 51 5.7	515.8	64.84	15 11.6	55 38.9	II. N.
10	23 32.82	1.889	22 51 53.25	123.48	-10 8 24.0	592.2	63.34	15 4.3	55 12.1	
12	0 17.23	1.817	23 40 22.10	119.16	- 6 1 30.5	637.1	62.18	14 57.9	54 48.4	
13	1 0.22	1.770	0 27 25.08	116.36	- 1 42 28.5	+653.5	61.44	14 52.4	54 28.3	I. S.
14	1 42.42	1.751	1 13 40.78	115.22	+ 2 37 50.0	644.0	61.17	14 48.2	54 13.1	I. S.
15	2 24.51	1.760	1 59 49.21	115.75	6 49 35.4	611.1	61.38	14 45.7	54 3.8	I. S.
16	3 7.12	1.785	2 46 29.52	117.86	10 43 39.9	555.8	62.01	14 44.9	54 0.7	I. S.
17	3 50.86	1.854	3 34 17.86	121.40	14 11 13.6	478.3	63.04	14 47.0	54 8.4	I. S.
18	4 36.24	1.931	4 23 44.67	126.01	+17 3 21.2	+378.4	64.31	14 51.4	54 24.6	I. S.
19	5 23.61	2.018	5 15 10.86	131.24	19 10 52.9	255.3	65.74	14 58.6	54 51.1	I. S.
20	6 13.08	2.104	6 8 43.67	136.44	20 24 34.7	+109.5	67.08	15 8.7	55 28.1	I. N.
21	7 4.49	2.177	7 4 13.57	140.86	20 35 53.5	- 55.7	68.18	15 21.4	56 14.8	I. N.
22	7 57.43	2.228	8 1 14.93	143.98	19 38 18.1	-233.4	68.91	15 36.2	57 9.2	I. N.
23	8 51.28	2.256	8 59 12.63	145.58	+17 29 0.2	-412.0	69.25	15 52.3	58 8.3	I. N.
24	9 45.55	2.263	9 57 33.08	145.96	14 10 28.9	-576.9	69.26	16 8.3	59 7.0	I. N.
25	10 39.82	2.260	10 55 54.71	145.82	9 51 32.7	-711.5	69.19	16 22.7	59 59.9	I. N.
26	11 34.05	2.262	11 54 14.27	145.92	+ 4 47 22.4	-600.6	69.18	16 33.8	60 40.7	I. N.
27	12 28.48	2.277	12 52 45.39	146.84	- 0 41 15.6	-832.2	69.39	16 40.2	61 4.3	II. N.
28	13 23.48	2.309	13 51 51.15	148.80	- 6 9 52.2	-799.9	69.91	16 41.1	61 7.8	II. S.
29	14 19.41	2.353	14 51 52.82	151.40	-11 12 49.9	-705.0	70.60	16 36.8	60 51.8	II. S.
30	15 16.39	2.393	15 52 57.09	153.82	-15 26 30.7	-555.8	71.30	16 27.9	60 19.1	II. S.
31	16 14.10	2.411	16 54 45.86	154.92	-18 32 17.1	-368.6	71.57	16 15.9	59 35.0	II. S.
32	17 11.81	2.390	17 56 34.43	153.68	-20 18 58.0	-164.0	71.32	16 2.2	58 44.8	II. N. S.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Apr. 1	17 11.81	2.390	17 56 34.43	153.68	-20 18 58.0	-164.0	71.32	16' 2.2	58' 44.8	II. N. S.
2	18 8.50	2.326	18 57 21.80	149.84	-20 43 48.7	+37.3	70.40	15 48.2	57 53.4	II. N.
3	19 3.20	2.227	19 55 45.68	143.86	-19 52 20.2	218.5	68.92	15 34.9	57 4.6	II. N.
4	19 55.27	2.110	20 52 18.44	136.81	-17 53 2.4	369.4	67.11	15 23.0	56 20.8	II. N.
5	20 44.50	1.994	21 45 35.67	129.84	-15 0 37.5	486.9	65.26	15 12.6	55 42.6	II. N.
6	21 31.11	1.893	22 36 17.78	123.75	-11 27 52.3	+571.7	63.60	15 3.9	55 10.8	II. N.
7	22 15.56	1.816	23 24 48.91	119.10	-7 27 25.7	626.0	62 30	14 56.9	54 44.9	II. N.
8	22 58.49	1.766	0 11 47.79	116.09	-3 10 51.4	652.4	61.44	14 51.4	54 24.8	II. N.
9	23 40.55	1.744	0 57 54.88	114.78	+1 11 12.6	653.6	61.05	14 47.3	54 9.8	
11	0 22.41	1.749	1 43 50.44	115.10	5 28 50.2	630.5	61.14	14 44.9	54 1.0	
12	1 4.72	1.781	2 30 12.36	116.96	+9 32 27.5	+583.7	61.67	14 43.5	53 55.9	I. S.
13	1 48.04	1.832	3 17 34.21	120.05	13 12 38.8	513.3	62.56	14 44.1	53 57.9	I. N. S.
14	2 32.77	1.896	4 6 22.78	124.11	16 19 59.4	419.3	63.68	14 46.2	54 6.6	I. S.
15	3 19.24	1.974	4 56 55.21	128.64	18 45 10.0	302.2	64.96	14 50.9	54 23.0	I. S.
16	4 7.51	2.047	5 49 16.02	133.03	20 19 16.5	164.5	66.17	14 57.7	54 47.9	I. N.
17	4 57.43	2.109	6 43 15.59	136.76	+20 54 26.2	+8.9	67.18	15 6.9	55 21.7	I. N.
18	5 48.61	2.152	7 38 31.92	139.38	20 21 43.0	-158.7	67.87	15 18.6	56 4.7	I. N.
19	6 40.61	2.177	8 34 36.76	140.84	18 47 2.4	-329.3	68.25	15 32.5	56 55.7	I. N.
20	7 32.99	2.186	9 31 4.70	141.40	16 2 5.1	-493.3	68.35	15 48.1	57 52.9	I. N.
21	8 25.52	2.192	10 27 41.93	141.72	12 14 53.4	-638.8	68.38	16 4.3	58 52.6	I. N.
22	9 18.26	2.205	11 24 31.24	142.52	+7 35 19.5	-752.9	68.52	16 20.0	59 50.1	I. N.
23	10 11.51	2.237	12 21 51.77	144.41	+2 18 27.4	-822.9	68.93	16 33.2	60 38.8	I. N.
24	11 5.78	2.290	13 20 13.57	147.63	-3 15 24.9	-836.0	69.69	16 42.5	61 12.8	I. N.
25	12 1.59	2.363	14 20 7.62	151.96	-8 41 31.3	-783.2	70.74	16 46.4	61 27.0	I. N.
26	12 59.22	2.439	15 21 51.68	156.61	-13 32 49.7	-662.6	71.86	16 44.2	61 19.2	II. N.
27	13 58.51	2.495	16 25 14.86	159.98	-17 23 50.5	-484.3	72.71	16 36.4	60 50.5	II. S.
28	14 58.62	2.504	17 29 28.06	160.55	-19 55 21.0	-269.6	72.90	16 24.2	60 5.7	II. N. S.
29	15 58.23	2.452	18 33 10.88	157.39	-20 58 17.2	-46.3	72.22	16 9.2	59 10.6	II. N.
30	16 55.89	2.345	19 34 56.48	150.93	-20 34 45.4	+159.2	70.72	15 53.2	58 11.6	II. N.
May 1	17 50.53	2.206	20 33 40.85	142.56	-18 55 30.9	330.5	68.68	15 37.5	57 14.0	II. N.
2	18 41.74	2.062	21 28 58.01	133.92	-16 15 39.6	+492.2	66.50	15 23.2	56 21.6	II. N.
3	19 29.65	1.935	22 20 57.45	126.26	-12 50 49.5	556.2	64.48	15 11.0	55 36.8	II. N.
4	20 14.84	1.836	23 10 12.33	120.32	-8 55 7.1	617.2	62.84	15 1.1	55 0.3	II. N.
5	20 58.03	1.769	23 57 27.36	116.30	-4 40 37.5	650.8	61.69	14 53.6	54 32.5	II. N.
6	21 40.03	1.736	0 43 30.83	114.30	-0 17 47.8	659.5	61.09	14 48.2	54 13.0	II. N.
7	22 21.62	1.735	1 29 9.84	114.24	+4 3 53.0	+645.1	61.02	14 44.9	54 0.8	II. N.
8	23 3.53	1.762	2 15 7.97	115.88	8 15 13.7	607.7	61.42	14 43.4	53 55.4	II. N.
9	23 46.39	1.813	3 2 3.13	118.94	12 6 53.3	546.5	62.24	14 43.6	53 56.1	
11	0 30.69	1.881	3 50 25.05	123.03	15 29 9.2	460.6	63.34	14 45.4	54 2.6	
12	1 16.74	1.957	4 40 31.99	127.58	18 12 5.2	350.1	64.58	14 48.7	54 14.8	I. N. S.
13	2 4.59	2.029	5 32 27.26	131.94	+20 6 3.7	+216.5	65.76	14 53.5	54 32.6	I. N.
14	2 54.01	2.086	6 25 57.64	135.29	21 2 40.1	+64.2	66.70	15 0.1	54 56.7	I. N.
15	3 44.56	2.122	7 20 35.59	137.52	20 55 47.3	-99.8	67.32	15 8.4	55 27.3	I. N.
16	4 35.67	2.133	8 15 46.93	138.91	19 42 33.0	-266.3	67.55	15 18.7	56 4.9	I. N.
17	5 26.83	2.198	9 11 1.50	137.88	+17 23 47.7	-426.0	67.50	15 30.6	56 48.8	I. N.



## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
May 17	5 26.83	2.128	9 11 1.50	137.88	+17 23 47.7	-426.0	67.50	15 30.6	56 48.8	I. N.
18	6 17.78	2.118	10 6 3.08	137.98	14 4 2.5	-569.6	67.36	15 44.1	57 38.3	I. N.
19	7 8.56	2.117	11 0 54.91	137.92	9 51 15.1	-689.4	67.33	15 58.5	58 31.2	I. N.
20	7 59.56	2.138	11 55 59.67	138.45	+ 4 56 48.6	-776.4	67.60	16 12.9	59 23.9	I. N.
21	8 51.40	2.168	12 51 55.09	141.47	- 0 24 10.2	-820.4	68.31	16 25.9	60 11.8	I. N.
22	9 44.82	2.270	13 49 26.00	146.38	- 5 52 17.3	-810.4	69.47	16 36.1	60 49.4	
23	10 40.50	2.373	14 49 12.44	152.84	-11 3 54.9	-736.7	70.95	16 42.0	61 11.1	I. N.
24	11 38.74	2.478	15 51 32.79	158.92	-15 32 40.1	-596.4	72.44	16 42.6	61 13.1	I. N.
25	12 39.17	2.549	16 56 5.06	163.95	-18 53 15.9	-398.5	73.47	16 37.5	60 54.5	II. N.
26	13 40.60	2.556	18 1 37.56	163.68	-20 47 9.4	-167.8	73.60	16 27.3	60 17.0	II. N.
27	14 41.26	2.485	19 6 23.62	159.41	-21 7 30.6	+ 63.5	72.65	16 13.5	59 26.2	II. N.
28	15 39.41	2.353	20 8 38.87	151.40	-20 0 14.5	266.4	70.80	15 57.6	58 27.9	II. N.
29	16 33.96	2.192	21 7 17.10	141.68	-17 40 18.6	425.6	68.46	15 41.4	57 28.2	II. N.
30	17 24.63	2.034	22 2 2.11	132.23	-14 26 1.9	538.7	66.09	15 26.1	56 32.3	II. N.
31	18 11.80	1.903	22 53 17.13	124.34	-10 34 46.2	611.6	64.04	15 12.7	55 43.1	II. N.
June 1	18 56.25	1.808	23 41 47.89	118.60	- 6 21 4.0	+652.0	62.49	15 1.8	55 3.1	II. N.
2	19 38.67	1.751	0 28 28.64	115.19	- 1 56 38.1	606.1	61.52	14 53.6	54 32.9	II. N.
3	20 20.58	1.731	1 14 14.44	113.98	+ 2 28 48.0	657.3	61.14	14 48.2	54 12.8	II. N.
4	21 2.23	1.746	1 59 57.24	114.89	6 46 29.0	627.3	61.33	14 45.2	54 2.0	II. N.
5	21 44.61	1.790	2 46 23.48	117.57	10 47 44.5	575.1	62.00	14 44.6	53 59.8	II. N.
6	22 28.35	1.858	3 34 11.74	121.64	+14 23 22.0	+498.7	63.04	14 46.0	54 5.0	II. N.
7	23 13.90	1.939	4 23 48.81	126.53	17 23 25.6	397.1	64.30	14 49.2	54 16.7	
9	0 1.44	2.021	5 15 25.37	131.45	19 37 39.1	270.0	65.57	14 53.8	54 33.6	
10	0 50.81	2.089	6 8 51.92	135.54	20 56 23.4	+120.6	66.63	14 59.6	54 55.0	I. N.
11	1 41.51	2.131	7 3 39.08	138.07	21 12 4.8	- 43.9	67.31	15 6.6	55 20.6	I. N.
12	2 32.85	2.142	7 59 4.39	138.72	+20 20 44.2	-212.8	67.53	15 14.6	55 49.9	I. N.
13	3 24.11	2.126	8 54 25.16	137.79	18 22 47.6	-375.1	67.34	15 23.5	56 22.7	I. N.
14	4 14.81	2.098	9 49 12.03	136.07	15 23 2.3	-520.3	66.97	15 33.4	56 59.1	I. N.
15	5 4.83	2.073	10 43 17.68	134.52	11 29 49.3	-641.1	66.63	15 44.1	57 38.4	I. N.
16	5 54.43	2.065	11 36 58.24	134.11	6 54 10.0	-731.5	66.54	15 55.3	58 19.6	I. N.
17	6 44.20	2.088	12 30 49.48	135.42	+ 1 49 20.7	-726.1	66.89	16 6.5	59 0.7	I. N.
18	7 34.96	2.150	13 25 39.99	139.06	- 3 28 53.0	-797.3	67.77	16 17.0	59 38.9	I. N.
19	8 27.57	2.243	14 22 22.00	144.75	- 8 41 44.2	-757.8	69.14	16 25.5	60 10.3	I. N.
20	9 22.75	2.359	15 21 38.58	151.78	-13 27 12.9	-659.7	70.80	16 31.1	60 31.0	I. N.
21	10 20.77	2.473	16 23 45.63	158.60	-17 21 16.1	-501.2	72.39	16 32.8	60 37.0	I. N.
22	11 21.12	2.546	17 28 12.87	163.07	-20 1 21.7	-292.8	73.41	16 29.8	60 26.3	I. N.
23	12 22.42	2.547	18 33 37.39	163.14	-21 11 56.8	- 59.1	73.43	16 22.5	59 59.2	II. N.
24	13 22.75	2.487	19 38 3.98	158.29	-20 49 20.0	+167.8	72.31	16 11.2	59 17.7	II. N.
25	14 20.37	2.327	20 39 47.26	149.86	-19 2 18.5	359.6	70.33	15 57.4	58 27.0	II. N.
26	15 14.27	2.164	21 37 46.62	140.04	-16 8 1.9	503.2	67.95	15 42.5	57 32.5	II. N.
27	16 4.31	2.010	22 31 53.41	130.77	-12 26 9.8	+598.5	65.66	15 27.9	56 38.9	II. N.
28	16 50.97	1.885	23 22 37.41	123.26	- 8 14 38.6	653.0	63.72	15 14.7	55 50.2	II. N.
29	17 35.00	1.799	0 10 48.56	118.07	- 3 48 6.7	675.0	62.35	15 3.6	55 9.7	II. N.
30	18 17.62	1.752	0 57 23.87	115.98	+ 0 41 56.0	671.4	61.59	14 55.2	54 38.7	II. N.
31	18 59.50	1.744	1 43 20.29	114.80	+ 5 6 6.6	+646.0	61.44	14 49.7	54 18.4	II. N.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limb.
	h m	m	h m s	s	° ' "	"	s	"	"	
July 1	18 59.50	1.744	1 43 20.29	114.80	+ 5 6 6.6	+646.0	61.44	14 49.7	54 18.4	II. N.
2	19 41.62	1.772	2 29 31.18	116.43	9 16 1.1	600.0	61.86	14 47.1	54 8.8	II. N.
3	20 24.78	1.829	3 16 43.77	119.87	13 3 14.1	532.2	62.74	14 47.1	54 9.1	II. N.
4	21 9.58	1.908	4 5 35.89	124.64	16 18 39.2	440.7	63.94	14 49.7	54 18.5	II. N.
5	21 56.43	1.997	4 56 31.32	130.01	18 52 19.6	323.3	65.29	14 54.4	54 35.7	II. N.
6	22 45.40	2.081	5 49 33.92	135.06	+20 34 0.0	+181.2	66.54	15 0.7	54 58.7	II. N.
7	23 36.15	2.143	6 44 24.06	138.83	21 14 26.8	+ 18.4	67.46	15 8.2	55 26.3	
9	0 28.02	2.172	7 40 21.28	140.58	20 47 20.5	-154.9	67.89	15 16.4	55 56.4	
10	1 20.16	2.166	8 36 34.38	140.20	19 10 58.0	-326.9	67.84	15 25.2	56 27.8	I. N.
11	2 11.80	2.134	9 32 18.33	138.29	16 28 56.5	-480.9	67.39	15 33.5	56 59.2	I. N.
12	3 2.55	2.094	10 27 7.78	135.85	+12 49 41.3	-610.3	66.83	15 41.9	57 30.1	I. N.
13	3 52.39	2.062	11 21 3.21	132.95	8 25 7.1	-706.6	66.41	15 50.0	57 59.9	I. N.
14	4 41.74	2.055	12 14 29.07	133.51	+ 3 29 19.3	-766.1	66.33	15 57.7	58 28.2	I. N.
15	5 31.31	2.081	13 8 7.44	135.05	- 1 42 7.7	-784.3	66.76	16 4.8	58 54.3	I. N.
16	6 21.92	2.143	14 2 49.41	138.81	- 6 52 13.2	-758.2	67.72	16 11.0	59 17.2	I. N.
17	7 14.43	2.228	14 59 25.30	144.42	-11 42 13.8	-683.3	69.11	16 15.9	59 34.9	I. N.
18	8 9.44	2.347	15 58 30.99	151.07	-15 51 48.8	-556.1	70.67	16 18.8	59 45.7	I. N.
19	9 7.01	2.445	17 0 11.21	156.99	-19 0 20.6	-379.1	72.05	16 19.2	59 47.1	I. N.
20	10 6.46	2.496	18 3 45.02	160.20	-20 50 10.4	-166.8	72.76	16 16.5	59 37.4	I. N.
21	11 6.39	2.481	19 7 46.74	159.19	-21 11 9.2	+ 60.2	72.47	16 10.7	59 16.0	I. S.
22	12 5.02	2.393	20 10 30.93	153.86	-20 4 1.2	+270.4	71.19	16 1.9	58 43.8	I. S.
23	13 0.91	2.359	21 10 29.99	145.74	-17 39 59.1	442.2	69.22	15 50.8	58 3.0	II. N.
24	13 53.32	2.109	22 6 59.64	136.78	-14 16 43.4	565.9	67.01	15 38.5	57 17.8	II. N.
25	14 42.25	1.973	23 0 0.56	128.55	-10 13 27.9	-643.0	64.96	15 25.9	56 31.6	II. N.
26	15 28.26	1.867	23 50 4.77	122.13	- 5 47 34.5	-680.5	63.33	15 14.1	55 48.0	II. N.
27	16 12.13	1.796	0 38 0.83	117.91	- 1 13 18.2	+686.4	62.24	15 3.9	55 10.5	II. N.
28	16 54.76	1.763	1 24 42.39	115.93	+ 3 17 58.0	666.5	61.75	14 56.0	54 41.5	II. N.
29	17 37.06	1.767	2 11 48.75	116.18	7 36 56.7	625.0	61.84	14 50.8	54 22.4	II. N.
30	18 19.86	1.804	2 57 55.26	118.42	11 35 14.5	569.9	62.45	14 48.5	54 14.1	II. N.
31	19 3.89	1.869	3 46 1.18	122.31	15 4 29.4	479.5	63.48	14 49.2	54 16.7	II. N.
Aug. 1	19 49.73	1.953	4 35 55.66	127.36	+17 55 43.6	+372.6	64.77	14 52.8	54 29.7	II. N.
2	20 37.69	2.043	5 27 57.56	132.72	19 59 17.5	241.1	66.11	14 58.8	54 52.1	II. N.
3	21 27.73	2.124	6 22 4.76	137.64	21 5 30.7	+ 86.3	67.28	15 7.0	55 21.9	II. N.
4	22 19.43	2.179	7 17 51.74	140.96	21 6 9.7	- 85.3	68.06	15 16.5	55 57.0	II. S.
5	23 12.05	2.199	8 14 34.09	142.20	19 56 28.3	-263.0	68.32	15 26.8	56 34.9	II. S.
7	0 4.75	2.187	9 11 21.48	141.45	+17 36 51.6	-439.6	68.12	15 37.1	57 12.7	
8	0 56.87	2.154	10 7 33.61	139.44	14 13 31.9	-579.4	67.63	15 46.6	57 47.6	
9	1 48.10	2.117	11 2 52.28	137.18	9 57 52.7	-692.5	67.11	15 54.9	58 17.9	I. N.
10	2 38.56	2.092	11 57 24.53	135.71	+ 5 4 56.3	-764.8	66.78	16 1.5	58 42.3	I. N.
11	3 28.71	2.093	12 51 38.77	135.77	- 0 8 2.9	-792.5	66.85	16 6.4	59 0.1	I. N.
12	4 19.26	2.126	13 46 16.80	137.72	- 5 22 45.0	-773.9	67.40	16 9.5	59 11.7	I. N.
13	5 10.97	2.189	14 42 4.26	141.51	-10 20 14.6	-706.3	68.39	16 11.1	59 17.3	I. N.
14	6 4.47	2.272	15 39 39.39	146.55	-14 41 24.1	-591.7	69.65	16 11.1	59 17.6	I. N.
15	7 0.04	2.357	16 39 19.61	151.68	-18 7 38.0	-432.5	70.89	16 9.8	59 12.5	I. N.
16	7 57.43	2.418	17 40 48.77	155.33	-20 22 38.4	-237.9	71.70	16 6.6	59 1.8	I. N.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi- diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Aug. 16	7 57.43	2.418	17 40 48.77	155.33	-20 22 38.4	-237.9	71.70	16 6.6	59 1.8	I. N.
17	8 55.72	2.429	18 43 12.13	156.02	-21 15 16.6	-24.0	71.82	16 2.4	58 45.4	I. S.
18	9 53.55	2.380	19 45 7.99	153.06	-20 42 24.9	+185.8	71.05	15 56.3	58 23.0	I. S.
19	10 49.56	2.280	20 45 14.22	147.06	-18 49 59.6	370.5	69.54	15 48.6	57 54.7	I. S.
20	11 42.80	2.155	21 42 34.41	139.49	-15 51 19.1	515.7	67.64	15 39.6	57 21.6	I. S.
21	12 32.97	2.028	22 36 49.22	131.85	-12 3 32.2	+615.9	65.70	15 29.7	56 45.4	II. N.
22	13 20.28	1.919	23 28 12.04	125.30	-7 44 14.7	673.9	64.01	15 19.5	56 8.0	II. N.
23	14 5.30	1.838	0 17 17.26	120.46	-3 9 19.6	695.1	62.78	15 9.8	55 32.4	II. N.
24	14 48.78	1.791	1 4 49.72	117.56	+1 27 48.5	685.9	62.07	15 1.3	55 1.0	II. N.
25	15 31.52	1.776	1 51 37.50	116.73	5 56 3.1	651.3	61.90	14 54.5	54 36.1	II. N.
26	16 14.29	1.793	2 38 27.77	117.76	+10 5 56.5	+594.5	62.24	14 50.1	54 19.8	II. N.
27	16 57.83	1.839	3 26 3.86	120.50	13 48 52.9	516.7	63.02	14 48.3	54 13.4	II. N.
28	17 42.75	1.907	4 15 2.47	124.57	16 56 25.6	417.4	64.14	14 49.6	54 18.0	II. N.
29	18 29.46	1.988	5 5 49.65	129.43	19 19 51.0	295.9	65.40	14 53.6	54 32.9	II. N.
30	19 18.16	2.070	5 58 36.13	134.38	20 50 13.2	+152.4	66.62	15 0.7	54 59.0	II. N.
31	20 8.72	2.139	6 53 13.18	138.54	+21 19 7.3	-10.6	67.65	15 10.3	55 34.3	II. S.
Sept. 1	21 0.64	2.183	7 49 14.53	141.25	20 40 2.2	-186.1	68.27	15 21.9	56 16.9	II. S.
2	21 53.29	2.199	8 45 59.30	142.19	18 50 4.9	-362.8	68.43	15 34.7	57 3.6	II. S.
3	22 46.02	2.191	9 42 47.88	141.65	15 51 27.3	-527.0	68.25	15 47.5	57 50.8	II. S.
4	23 38.35	2.170	10 39 12.99	140.37	11 52 4.9	-664.4	67.90	15 59.4	58 34.3	
6	0 30.18	2.151	11 35 7.76	139.29	+7 5 13.2	-762.7	67.63	16 9.2	59 10.3	
7	1 21.74	2.149	12 30 43.37	139.14	+1 48 22.3	-812.9	67.62	16 16.1	59 35.9	I. N.
8	2 13.52	2.171	13 26 38.56	140.46	-3 38 9.9	-810.0	68.00	16 19.8	59 49.4	I. N.
9	3 6.14	2.218	14 23 20.69	143.29	-8 52 46.6	-752.9	68.77	16 20.2	59 51.0	I. N.
10	4 0.12	2.283	15 21 24.89	147.19	-13 33 56.2	-644.0	69.80	16 17.8	59 42.1	I. N.
11	4 55.75	2.349	16 21 6.58	151.20	-17 21 43.3	-487.9	70.82	16 13.1	59 24.9	I. N.
12	5 52.73	2.395	17 22 13.31	154.03	-19 59 37.6	-296.9	71.53	16 6.9	59 2.0	I. N.
13	6 50.42	2.402	18 24 0.43	154.38	-21 16 43.1	-87.0	71.60	15 59.6	58 35.4	I. S.
14	7 47.64	2.357	19 25 19.95	151.71	-21 9 28.8	+121.4	70.91	15 51.8	58 6.7	I. S.
15	8 43.22	2.269	20 25 1.41	146.38	-19 42 21.3	309.5	69.54	15 43.7	57 36.7	I. S.
16	9 36.36	2.156	21 22 13.89	139.55	-17 6 19.6	+464.4	67.77	15 35.3	57 6.0	I. S.
17	10 26.66	2.038	22 16 36.83	132.44	-13 36 15.3	579.4	65.91	15 26.9	56 35.0	I. S.
18	11 14.28	1.934	23 8 18.39	126.21	-9 28 13.1	654.4	64.26	15 18.5	56 4.3	I. S.
19	11 59.69	1.854	23 57 46.64	121.41	-4 57 40.5	692.5	62.97	15 10.4	55 34.5	I. S.
20	12 43.52	1.803	0 45 40.29	118.35	-0 18 34.3	697.9	62.17	15 2.8	55 6.6	II. N.
21	13 26.48	1.782	1 32 41.95	117.07	+4 16 50.4	+674.7	61.86	14 56.2	54 42.4	II. N.
22	14 9.29	1.799	2 19 33.81	117.50	8 37 49.0	696.3	62.04	14 51.0	54 23.3	II. N.
23	14 52.58	1.822	3 6 54.85	119.47	12 34 42.3	554.5	62.64	14 47.6	54 10.9	II. N.
24	15 36.91	1.875	3 55 18.41	122.66	15 58 32.2	461.0	63.57	14 46.5	54 6.9	II. N.
25	16 22.69	1.942	4 45 9.36	126.67	18 40 42.3	346.1	64.69	14 48.0	54 12.4	II. N.
26	17 10.13	2.012	5 36 40.52	130.93	+20 32 53.6	+211.4	65.84	14 52.4	54 28.5	II. N.
27	17 59.23	2.077	6 29 50.75	134.81	21 27 22.5	+58.4	66.86	14 59.7	54 55.3	II. S.
28	18 49.70	2.126	7 24 23.92	137.76	21 17 44.1	-108.3	67.60	15 9.9	55 32.7	II. S.
29	19 41.11	2.154	8 19 53.15	139.47	19 59 54.9	-281.2	67.98	15 22.5	56 19.1	II. S.
30	20 32.95	2.164	9 15 49.08	140.04	+17 33 20.1	-450.3	68.06	15 37.0	57 12.2	II. S.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Oct. 1	21 24.87	2.163	10 11 49.45	139.94	+14 1 48.5	-603.9	67.98	15 52.2	58 8.1	II. S.
2	22 16.75	2.162	11 7 46.94	139.91	9 34 5.7	-728.8	67.91	16 6.9	59 2.2	II. S.
3	23 8.74	2.174	12 3 51.70	140.66	+ 4 24 4.2	-813.2	68.06	16 19.6	59 48.7	
5	0 1.27	2.208	13 0 28.79	142.66	- 1 9 33.2	-845.2	68.55	16 28.9	60 22.9	
6	0 54.89	2.264	13 58 11.00	146.05	- 6 44 4.0	-816.8	69.42	16 33.8	60 40.8	I. N.
7	1 50.08	2.337	14 57 28.04	150.46	-11 54 30.1	-794.9	70.56	16 34.1	60 41.0	I. N.
8	2 47.06	2.409	15 58 32.76	154.82	-16 16 9.8	-574.3	71.66	16 29.4	60 24.7	I. N.
9	3 45.54	2.457	17 1 7.98	157.74	-19 27 56.7	-378.5	72.43	16 21.3	59 55.1	I. N.
10	4 44.66	2.458	18 4 21.38	157.81	-21 15 43.2	-158.3	72.50	16 11.0	59 17.0	I. N.
11	5 43.13	2.404	19 6 55.94	154.50	-21 34 41.0	+ 62.0	71.73	15 59.4	58 34.4	I. S.
12	6 39.68	2.302	20 7 34.37	148.32	-20 29 25.3	+259.7	70.22	15 47.6	57 51.2	I. S.
13	7 33.41	2.174	21 5 23.53	140.64	-18 11 32.7	423.3	68.27	15 36.3	57 9.8	I. S.
14	8 24.02	2.046	22 0 5.14	132.91	-14 56 12.3	547.0	66.25	15 26.0	56 31.9	I. S.
15	9 11.72	1.934	22 51 51.81	126.21	-10 59 12.6	631.9	64.44	15 16.7	55 57.7	I. S.
16	9 57.06	1.850	23 41 16.07	121.12	- 6 35 23.5	682.2	63.02	15 8.6	55 27.7	I. S.
17	10 40.73	1.795	0 29 0.11	117.87	- 1 58 6.6	+699.9	62.10	15 1.4	55 1.6	I. S.
18	11 23.48	1.772	1 15 48.47	116.46	+ 2 40 36.8	689.3	61.70	14 55.5	54 39.6	I. S.
19	12 6.02	1.777	2 2 24.14	116.77	7 9 46.9	652.4	61.78	14 50.6	54 21.6	II. S.
20	12 48.98	1.807	2 49 25.52	118.57	11 19 5.4	590.1	62.29	14 47.0	54 8.6	II. S.
21	13 32.90	1.856	3 37 24.32	121.49	14 58 44.1	503.9	63.13	14 44.9	54 0.9	II. N.
22	14 18.14	1.915	4 26 42.79	125.12	+17 59 21.1	+395.3	64.16	14 44.7	54 0.1	II. N.
23	15 4.87	1.978	5 17 31.16	128.82	20 12 12.3	265.7	65.23	14 46.5	54 6.8	II. S.
24	15 53.04	2.034	6 9 45.79	132.21	21 29 35.2	+118.7	66.16	14 50.8	54 22.4	II. S.
25	16 42.37	2.073	7 3 9.99	134.61	21 45 26.3	- 41.0	66.84	14 57.7	54 47.7	II. S.
26	17 32.43	2.095	7 57 18.64	135.91	20 55 59.7	-206.6	67.20	15 7.3	55 23.1	II. S.
27	18 22.81	2.101	8 51 46.03	136.25	+19 0 19.4	-370.9	67.29	15 19.5	56 8.0	II. S.
28	19 13.21	2.099	9 46 14.67	136.06	16 0 38.7	-525.2	67.23	15 34.1	57 1.4	II. S.
29	20 3.58	2.101	10 40 41.99	136.25	12 2 33.3	-661.2	67.21	15 50.0	58 0.2	II. S.
30	20 54.18	2.119	11 35 22.55	137.34	7 15 21.2	-769.0	67.43	16 6.5	59 0.4	II. S.
31	21 45.49	2.163	12 30 46.70	139.96	+ 1 52 37.1	-837.0	68.03	16 21.8	59 56.6	II. S.
Nov. 1	22 38.21	2.226	13 27 34.92	144.35	- 3 47 9.8	-852.1	69.08	16 34.1	60 42.0	II. S.
2	23 33.01	2.335	14 26 28.47	150.31	- 9 20 29.1	-803.0	70.52	16 41.9	61 10.5	
4	0 30.35	2.444	15 27 54.58	156.86	-14 20 8.3	-683.4	72.12	16 44.4	61 19.7	
5	1 30.15	2.533	16 31 48.97	162.29	-18 18 36.3	-499.1	73.45	16 40.9	61 6.8	I. N.
6	2 31.53	2.569	17 37 18.56	164.49	-20 53 24.7	-269.6	74.03	16 32.2	60 34.9	I. N.
7	3 32.91	2.531	18 42 47.91	162.15	-21 52 37.6	- 26.8	73.55	16 19.7	59 49.1	I. S.
8	4 32.47	2.422	19 46 27.85	155.57	-21 17 23.7	+197.9	72.04	16 5.2	58 55.7	I. S.
9	5 28.82	2.271	20 46 55.13	146.46	-19 19 44.6	383.0	69.85	15 50.1	58 0.2	I. S.
10	6 21.40	2.112	21 43 34.62	136.90	-16 17 18.9	591.6	67.45	15 35.7	57 7.3	I. S.
11	7 10.34	1.972	22 36 35.67	128.46	-12 28 27.4	615.9	65.25	15 22.8	56 19.9	I. S.
12	7 56.28	1.863	23 26 36.27	121.96	- 8 9 32.6	+672.8	63.48	15 11.6	55 39.1	I. S.
13	8 40.07	1.792	0 14 27.19	117.66	- 3 34 19.9	698.4	62.26	15 2.6	55 5.8	I. S.
14	9 22.59	1.757	1 1 1.96	115.57	+ 1 5 29.9	696.4	61.62	14 55.5	54 39.6	I. S.
15	10 4.69	1.756	1 47 11.30	115.50	5 39 33.3	669.6	61.55	14 50.1	54 20.1	I. S.
16	10 47.11	1.783	2 33 40.38	117.18	+ 9 57 58.2	+618.4	61.96	14 46.5	54 6.7	I. S.

## AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF WASHINGTON.

Date.	Mean Time of Transit.	Diff. for 1 Hour of Long.	Right Ascension of Centre.	Diff. for 1 Hour of Long.	Geocentric Declination of Centre.	Diff. for 1 Hour of Long.	Sid. Time of Semid. Passing Meridian.	Geocentric Semi- diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
	h m	m	h m s	s	° ' "	"	s	' "	' "	
Nov. 16	10 47.11	1.783	2 33 40.38	117.18	+ 9 57 58.2	+618.4	61.96	14 46.5	54 6.7	I. S.
17	11 30.48	1.834	3 21 6.25	120.17	13 50 56.8	542.4	62.75	14 44.4	53 58.9	I. S.
18	12 15.23	1.897	4 9 55.20	123.97	17 8 38.0	442.1	63.78	14 43.7	53 56.5	II. S.
19	13 1.56	1.963	5 0 19.24	127.98	19 41 25.2	318.4	64.86	14 44.6	53 59.6	II. S.
20	13 49.40	2.020	5 52 13.68	131.41	21 20 36.9	174.8	65.80	14 47.0	54 8.6	II. S.
21	14 38.38	2.057	6 45 17.42	133.67	+21 59 24.4	+ 17.3	66.46	14 51.3	54 24.4	II. S.
22	15 27.98	2.071	7 38 58.24	134.49	21 33 45.7	-146.6	66.74	14 57.6	54 47.4	II. S.
23	16 17.64	2.064	8 32 42.56	134.03	20 2 58.3	-306.8	66.69	15 6.0	55 18.5	II. S.
24	17 6.96	2.045	9 26 6.26	132.89	17 29 34.5	-457.8	66.44	15 16.7	55 57.8	II. S.
25	17 55.82	2.009	10 19 2.61	131.90	13 58 56.5	-592.2	66.20	15 29.6	56 45.0	II. S.
26	18 44.46	2.008	11 11 45.16	131.88	+ 9 38 49.3	-704.3	66.19	15 44.3	57 38.9	II. S.
27	19 33.40	2.056	12 4 46.34	132.55	+ 4 39 25.9	-787.3	66.59	15 59.9	58 36.4	II. S.
28	20 23.44	2.130	12 58 53.19	137.40	- 0 45 53.3	-832.1	67.52	16 15.5	59 33.6	II. S.
29	21 15.47	2.223	13 55 0.56	143.58	- 6 19 35.0	-826.9	69.01	16 29.4	60 24.8	II. S.
30	22 10.37	2.357	14 54 0.12	151.61	-11 39 2.7	-759.0	70.93	16 40.0	61 3.5	II. S.
Dec. 1	23 8.64	2.498	15 56 22.33	160.14	-16 17 7.3	-619.6	72.95	16 45.6	61 24.2	
3	0 10.03	2.608	17 1 52.36	166.81	-19 45 35.7	-413.2	74.51	16 45.3	61 23.0	
4	1 13.25	2.643	18 9 12.68	168.95	-21 41 42.8	-163.4	75.04	16 39.0	60 59.8	I. S.
5	2 16.17	2.589	19 16 14.47	165.35	-21 55 26.9	+ 91.6	74.23	16 27.6	60 17.9	I. S.
6	3 16.57	2.441	20 20 45.10	156.69	-20 32 29.1	315.2	72.27	16 12.8	59 23.6	I. S.
7	4 13.02	2.261	21 21 17.30	145.86	-17 50 13.5	+486.4	69.67	15 56.4	58 23.4	I. S.
8	5 5.11	2.064	22 17 29.07	135.24	-14 10 37.9	602.8	67.06	15 40.0	57 23.4	I. S.
9	5 53.30	1.938	23 9 43.97	126.46	- 9 54 19.3	671.4	64.80	15 25.0	56 28.1	I. S.
10	6 38.46	1.833	23 58 57.62	120.14	- 5 18 5.6	703.6	63.10	15 12.0	55 40.5	I. S.
11	7 21.62	1.771	0 46 10.98	116.39	- 0 35 21.4	706.1	62.03	15 1.2	55 1.9	I. S.
12	8 3.78	1.749	1 32 23.88	115.07	+ 4 33 30.7	+684.4	61.63	14 53.6	54 33.0	I. S.
13	8 45.85	1.769	2 18 31.73	115.91	8 29 9.9	640.2	61.80	14 48.3	54 13.2	I. S.
14	9 28.62	1.806	3 5 21.67	118.53	12 32 38.5	573.3	62.45	14 45.2	54 2.0	I. S.
15	10 12.71	1.871	3 53 31.00	122.39	16 4 40.1	482.8	63.43	14 44.2	53 58.2	I. S.
16	10 58.49	1.945	4 43 21.52	126.83	18 55 35.8	367.9	64.56	14 44.9	54 0.8	I. S.
17	11 46.01	2.013	5 34 57.04	130.99	+20 55 54.5	+230.2	65.64	14 47.4	54 10.1	I. S.
18	12 34.97	2.063	6 28 0.29	134.02	21 57 20.6	+ 74.5	66.41	14 50.8	54 22.5	II. S.
19	13 24.84	2.085	7 21 56.11	135.32	21 54 16.2	- 90.8	66.78	14 55.7	54 40.6	II. S.
20	14 14.83	2.076	8 16 0.81	134.80	20 44 55.0	-255.0	66.70	15 1.9	55 3.4	II. S.
21	15 4.34	2.046	9 9 36.07	132.99	18 31 35.6	-408.8	66.30	15 9.5	55 31.1	II. S.
22	15 53.01	2.009	10 2 20.67	130.74	+15 20 14.9	-544.1	65.79	15 18.5	56 4.1	II. S.
23	16 40.87	1.982	10 54 16.47	129.06	11 19 23.5	-655.8	65.41	15 28.9	56 42.3	II. S.
24	17 28.32	1.979	11 45 47.95	126.85	6 39 17.2	-739.8	65.39	15 40.6	57 25.4	II. S.
25	18 16.08	2.009	12 37 37.93	130.71	+ 1 31 44.2	-792.1	65.88	15 53.3	58 12.1	II. S.
26	19 5.07	2.082	13 30 42.22	135.02	- 3 49 20.2	-806.3	66.99	16 6.4	59 0.1	II. S.
27	19 56.32	2.196	14 26 2.03	141.97	- 9 6 51.1	-772.7	68.69	16 18.8	59 45.7	II. S.
28	20 50.74	2.343	15 24 32.53	150.80	-13 59 36.5	-680.6	70.81	16 29.3	60 24.2	II. S.
29	21 48.82	2.496	16 26 43.48	159.99	-18 2 36.0	-523.3	72.96	16 36.3	60 50.1	II. S.
30	22 50.22	2.610	17 32 13.94	166.93	-20 50 4.2	-305.5	74.37	16 38.8	60 59.1	II. S.
31	23 53.47	2.642	18 39 35.93	168.86	-22 1 58.3	- 50.8	74.98	16 35.9	60 48.6	

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	-	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	-	S.T. of Sem. Pass. Mer.
	h m	h m s	° "	"	" s		h m	h m s	° "	"	" s
Jan. 0	23 20.0	18 3 6.63	-24 19 45.3	6.3	2.4 0.17	Feb. 16	1 20.9	23 5 37.10	-4 42 5.8	9.3	3.5 0.22
1	23 22.9	18 9 55.65	24 24 42.3	6.3	2.4 0.17	17	1 20.1	23 8 48.66	4 5 24.6	9.6	3.6 0.23
2	23 25.8	18 16 46.69	24 28 20.7	6.3	2.4 0.17	18	1 18.9	23 11 30.32	3 31 37.5	9.9	3.7 0.24
3	23 28.7	18 23 39.65	24 30 39.5	6.3	2.4 0.17	19	1 17.1	23 13 40.21	3 1 8.4	10.2	3.8 0.25
4	23 31.7	18 30 34.41	24 31 37.5	6.2	2.4 0.17	20	1 14.8	23 15 16.86	2 34 20.2	10.5	3.9 0.26
5	23 34.7	18 37 30.85	-24 31 13.4	6.2	2.4 0.17	21	1 11.9	23 16 19.12	-2 11 33.2	10.9	4.1 0.27
6	23 37.7	18 44 28.87	24 29 26.1	6.2	2.3 0.17	22	1 8.4	23 16 46.33	1 53 5.6	11.2	4.2 0.27
7	23 40.7	18 51 28.36	24 26 14.4	6.2	2.3 0.17	23	1 4.3	23 16 38.43	1 39 12.5	11.6	4.3 0.28
8	23 43.8	18 58 29.22	24 21 37.3	6.2	2.3 0.17	24	0 59.7	23 15 55.94	1 30 5.1	11.9	4.5 0.29
9	23 46.8	19 5 31.32	24 15 33.8	6.2	2.3 0.17	25	0 54.6	23 14 40.10	1 25 49.3	12.3	4.6 0.30
10	23 49.9	19 12 34.56	-24 8 2.9	6.2	2.3 0.17	26	0 48.9	23 12 52.89	-1 26 26.3	12.6	4.7 0.31
11	23 53.1	19 19 38.82	23 59 3.7	6.2	2.3 0.17	27	0 42.6	23 10 36.98	1 31 50.8	12.8	4.8 0.32
12	23 56.2	19 26 44.01	23 48 35.4	6.2	2.3 0.17	28	0 35.9	23 7 55.79	1 41 51.5	13.1	4.9 0.32
13	23 59.3	19 33 49.99	23 36 37.1	6.2	2.3 0.17	29	0 28.9	23 4 53.37	1 56 10.7	13.4	5.1 0.33
15	0 2.5	19 40 56.64	23 23 8.0	6.2	2.3 0.17	Mar. 1	0 21.7	23 1 34.27	2 14 24.5	13.7	5.2 0.34
16	0 5.7	19 48 3.83	-23 8 7.1	6.2	2.3 0.17	2	0 14.3	22 58 3.42	-2 36 3.7	13.9	5.2 0.34
17	0 8.8	19 55 11.45	22 51 34.7	6.2	2.3 0.17	3	0 6.8	22 54 25.92	3 0 34.7	14.0	5.3 0.35
18	0 12.0	20 2 19.36	22 33 29.2	6.2	2.3 0.17	3	23 59.3	22 50 46.94	3 27 20.9	14.1	5.3 0.35
19	0 15.2	20 9 27.43	22 13 50.7	6.3	2.4 0.17	4	23 51.8	22 47 11.40	3 55 44.0	14.2	5.4 0.36
20	0 18.4	20 16 35.53	21 52 38.7	6.3	2.4 0.17	5	23 44.4	22 43 43.89	4 25 6.5	14.3	5.4 0.36
21	0 21.6	20 23 43.50	-21 29 52.8	6.3	2.4 0.17	6	23 37.2	22 40 28.52	-4 54 51.7	14.3	5.4 0.36
22	0 24.7	20 30 51.19	21 5 32.8	6.3	2.4 0.17	7	23 30.3	22 37 28.76	5 24 26.1	14.2	5.3 0.37
23	0 27.9	20 37 58.42	20 39 38.8	6.4	2.4 0.17	8	23 23.7	22 34 47.55	5 53 19.6	14.1	5.3 0.36
24	0 31.1	20 45 5.00	20 12 11.0	6.4	2.4 0.17	9	23 17.4	22 32 27.14	6 21 5.6	14.0	5.3 0.36
25	0 34.2	20 52 10.75	19 43 9.5	6.4	2.4 0.17	10	23 11.5	22 30 29.02	6 47 23.5	13.9	5.2 0.35
26	0 37.4	20 59 15.41	-19 12 35.2	6.5	2.4 0.17	11	23 6.0	22 28 54.27	-7 11 55.9	13.7	5.2 0.35
27	0 40.5	21 6 18.71	18 40 28.9	6.5	2.5 0.18	12	23 0.8	22 27 43.42	7 34 29.0	13.5	5.1 0.34
28	0 43.5	21 13 20.38	18 6 51.8	6.6	2.5 0.18	13	22 56.1	22 26 56.55	7 54 53.4	13.3	5.0 0.33
29	0 46.6	21 20 20.08	17 31 45.4	6.6	2.5 0.18	14	22 51.8	22 26 33.41	8 13 2.3	13.1	5.0 0.33
30	0 49.6	21 27 17.42	16 55 12.2	6.7	2.5 0.18	15	22 47.9	22 26 33.46	8 28 51.6	12.9	4.9 0.32
31	0 52.6	21 34 11.96	-16 17 14.8	6.8	2.5 0.18	16	22 44.4	22 26 55.94	-8 42 19.5	12.7	4.8 0.32
Feb. 1	0 55.5	21 41 3.16	15 37 56.1	6.9	2.6 0.18	17	22 41.2	22 27 39.94	8 53 25.6	12.4	4.7 0.31
2	0 58.3	21 47 50.43	14 57 20.6	7.0	2.6 0.18	18	22 38.3	22 28 44.48	9 2 10.7	12.2	4.6 0.31
3	1 1.0	21 54 33.14	14 15 33.6	7.0	2.6 0.19	19	22 35.8	22 30 8.50	9 8 36.8	12.0	4.6 0.30
4	1 3.7	22 1 10.45	13 32 40.6	7.1	2.7 0.19	20	22 33.5	22 31 50.93	9 12 46.4	11.8	4.5 0.30
5	1 6.3	22 7 41.42	-12 48 48.8	7.2	2.7 0.19	21	22 31.5	22 33 50.69	-9 14 42.7	11.6	4.4 0.29
6	1 8.8	22 14 5.01	12 4 7.1	7.4	2.8 0.19	22	22 29.8	22 36 6.71	9 14 28.8	11.4	4.3 0.29
7	1 11.1	22 20 20.06	11 18 45.5	7.5	2.8 0.20	23	22 28.5	22 38 37.97	9 12 8.2	11.2	4.2 0.28
8	1 13.2	22 26 25.20	10 32 55.6	7.7	2.9 0.20	24	22 27.4	22 41 23.50	9 7 44.5	11.0	4.2 0.28
9	1 15.2	22 32 18.93	9 46 50.7	7.8	2.9 0.20	25	22 26.4	22 44 22.36	9 1 21.4	10.8	4.1 0.27
10	1 16.9	22 37 59.57	-9 0 45.9	8.0	3.0 0.20	26	22 25.6	22 47 33.69	-8 53 2.5	10.6	4.0 0.27
11	1 18.4	22 43 25.27	8 14 58.1	8.2	3.1 0.21	27	22 25.0	22 50 56.69	8 42 51.1	10.4	3.9 0.26
12	1 19.6	22 48 34.09	7 29 46.2	8.4	3.1 0.21	28	22 24.6	22 54 30.61	8 30 50.5	10.3	3.8 0.26
13	1 20.5	22 53 23.91	6 45 30.5	8.6	3.2 0.21	29	22 24.5	22 58 14.75	8 17 4.0	10.1	3.8 0.25
14	1 21.0	22 57 52.53	6 2 32.9	8.8	3.3 0.22	30	22 24.4	23 2 8.46	8 1 34.8	9.9	3.7 0.25
15	1 21.2	23 1 57.68	-5 21 16.6	9.0	3.4 0.22	31	22 24.5	23 6 11.17	-7 44 25.8	9.7	3.7 0.25
16	1 20.9	23 5 37.10	-4 42 5.8	9.3	3.5 0.22	32	22 24.7	23 10 22.36	-7 25 39.8	9.6	3.6 0.24

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Sem. diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Sem. diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	22 24.7	23 10 22.36	- 7 25 39.8	9.6	3.6	0.24	May 18	0 34.2	4 21 29.69	+23 54 22.9	7.0	2.6	0.19
2	22 25.1	23 14 41.54	7 5 19.5	9.4	3.6	0.24	19	0 39.1	4 30 23.64	23 22 13.4	7.1	2.7	0.19
3	22 25.6	23 19 8.28	6 43 27.4	9.3	3.5	0.23	20	0 43.9	4 39 13.34	23 47 25.5	7.2	2.7	0.19
4	22 26.2	23 23 42.20	6 20 6.1	9.2	3.5	0.23	21	0 48.7	4 47 57.57	24 9 57.1	7.3	2.7	0.19
5	22 27.0	23 28 22.98	5 55 18.1	9.0	3.4	0.23	22	0 53.4	4 56 35.18	24 29 47.7	7.4	2.8	0.20
6	22 27.8	23 33 10.33	- 5 29 5.6	8.9	3.4	0.22	23	0 58.0	5 5 5.10	+24 46 58.4	7.5	2.8	0.20
7	22 28.8	23 38 3.98	5 130.8	8.8	3.3	0.22	24	1 2.4	5 13 26.34	25 131.8	7.6	2.8	0.21
8	22 29.8	23 43 3.69	4 32 35.8	8.6	3.3	0.21	25	1 6.6	5 21 38.04	25 1331.4	7.7	2.9	0.21
9	22 30.9	23 48 9.31	4 222.5	8.5	3.2	0.21	26	1 10.7	5 29 39.45	25 23 1.5	7.8	2.9	0.21
10	22 32.2	23 53 20.70	3 30 52.9	8.4	3.2	0.21	27	1 14.6	5 37 29.87	25 30 7.2	8.0	3.0	0.22
11	22 33.6	23 58 37.74	- 2 58 9.0	8.3	3.1	0.21	28	1 18.3	5 45 8.68	+25 34 54.3	8.1	3.1	0.22
12	22 35.0	0 4 0.35	2 24 12.9	8.2	3.1	0.20	29	1 21.8	5 52 35.35	25 37 28.9	8.2	3.1	0.23
13	22 36.5	0 9 28.50	1 49 6.5	8.1	3.0	0.20	30	1 25.0	5 59 49.44	25 37 57.6	8.4	3.2	0.23
14	22 38.1	0 15 2.17	1 12 51.4	8.0	3.0	0.20	31	1 28.0	6 5 50.51	25 36 26.9	8.6	3.2	0.23
15	22 39.8	0 20 41.37	- 0 35 29.4	7.9	3.0	0.20	June 1	1 30.9	6 13 38.19	25 33 3.5	8.7	3.3	0.24
16	22 41.6	0 26 26.15	+ 0 2 57.5	7.8	2.9	0.20	2	1 33.6	6 20 12.15	+25 27 54.4	8.9	3.4	0.24
17	22 43.5	0 32 16.59	0 42 27.5	7.7	2.9	0.19	3	1 36.0	6 26 32.08	25 21 6.4	9.1	3.4	0.25
18	22 45.5	0 38 12.78	1 22 58.5	7.6	2.9	0.19	4	1 38.1	6 32 37.6	25 12 46.3	9.2	3.5	0.25
19	22 47.6	0 44 14.84	2 4 28.4	7.5	2.8	0.19	5	1 40.0	6 38 28.72	25 3 0.8	9.4	3.5	0.26
20	22 49.8	0 50 22.92	2 46 55.1	7.5	2.8	0.19	6	1 41.6	6 44 4.88	24 51 56.7	9.6	3.6	0.26
21	22 52.1	0 56 37.18	+ 3 30 16.3	7.4	2.8	0.19	7	1 43.0	6 49 25.96	+24 39 40.5	9.8	3.7	0.27
22	22 54.5	1 2 57.83	4 14 29.6	7.3	2.8	0.18	8	1 44.2	6 54 31.66	24 26 18.7	10.0	3.8	0.28
23	22 56.9	1 9 25.09	4 50 32.4	7.3	2.7	0.18	9	1 45.1	6 59 21.74	24 11 57.9	10.2	3.8	0.28
24	22 59.6	1 15 59.17	5 45 21.8	7.2	2.7	0.18	10	1 45.7	7 3 55.90	23 56 44.4	10.5	3.9	0.29
25	23 2.3	1 22 40.29	6 31 54.5	7.1	2.7	0.18	11	1 46.1	7 8 13.84	23 40 44.5	10.7	4.0	0.29
26	23 5.2	1 29 28.72	+ 7 19 6.8	7.1	2.7	0.18	12	1 46.2	7 12 15.30	+23 24 4.3	11.0	4.1	0.30
27	23 8.2	1 36 24.69	8 6 54.8	7.0	2.6	0.18	13	1 46.0	7 15 59.98	23 6 50.2	11.2	4.2	0.31
28	23 11.3	1 43 28.45	8 55 14.3	7.0	2.6	0.18	14	1 45.5	7 19 27.58	22 49 8.1	11.4	4.3	0.31
29	23 14.5	1 50 40.27	9 44 0.1	6.9	2.6	0.18	15	1 44.7	7 22 37.76	22 31 4.2	11.6	4.4	0.32
30	23 17.9	1 58 0.33	10 33 6.7	6.9	2.6	0.18	16	1 43.7	7 25 30.19	22 12 44.4	11.9	4.5	0.32
May 1	23 21.5	2 5 28.82	+11 22 27.9	6.8	2.6	0.18	17	1 42.3	7 28 4.59	+21 54 15.0	12.1	4.6	0.33
2	23 25.1	2 13 5.90	12 11 56.6	6.8	2.5	0.18	18	1 40.6	7 30 20.67	21 35 41.9	12.4	4.7	0.34
3	23 28.9	2 20 51.65	13 1 24.9	6.8	2.5	0.17	19	1 38.7	7 32 18.09	21 17 11.0	12.6	4.7	0.34
4	23 32.9	2 28 46.11	13 50 44.4	6.7	2.5	0.17	20	1 36.4	7 33 56.60	20 58 48.3	12.9	4.8	0.35
5	23 37.0	2 36 49.22	14 39 45.5	6.7	2.5	0.17	21	1 33.7	7 35 15.98	20 40 39.8	13.1	4.9	0.35
6	23 41.2	2 45 0.79	+15 28 17.9	6.7	2.5	0.17	22	1 30.7	7 36 16.06	+20 22 51.6	13.4	5.0	0.36
7	23 45.6	2 53 20.52	16 16 10.6	6.7	2.5	0.17	23	1 27.5	7 36 56.70	20 5 29.5	13.6	5.1	0.36
8	23 50.1	3 1 48.05	17 3 11.9	6.7	2.5	0.17	24	1 24.0	7 37 17.91	19 48 39.3	13.9	5.2	0.37
9	23 54.7	3 10 22.82	17 49 9.3	6.7	2.5	0.18	25	1 20.1	7 37 19.74	19 32 26.8	14.1	5.3	0.37
10	23 59.4	3 19 4.11	18 33 50.3	6.7	2.5	0.18	26	1 15.9	7 37 2.43	19 16 57.4	14.3	5.4	0.38
12	0 4.2	3 27 51.07	+19 17 2.2	6.7	2.5	0.18	27	1 11.3	7 36 26.31	+19 2 16.6	14.5	5.5	0.38
13	0 9.1	3 36 42.72	19 58 32.8	6.7	2.5	0.18	28	1 6.4	7 35 31.92	18 48 29.7	14.7	5.5	0.39
14	0 14.1	3 45 37.98	20 38 10.1	6.8	2.6	0.18	29	1 1.3	7 34 19.97	18 35 41.7	14.9	5.6	0.39
15	0 19.1	3 54 35.61	21 15 43.0	6.8	2.6	0.18	30	0 55.9	7 32 51.37	18 23 57.2	15.1	5.7	0.39
16	0 24.2	4 3 34.33	21 51 1.4	6.9	2.6	0.18	31	0 50.3	7 31 7.25	18 13 20.4	15.2	5.7	0.39
17	0 29.2	4 12 32.81	+22 23 57.1	7.0	2.6	0.19	32	0 44.4	7 29 8.98	+18 3 55.3	15.3	5.8	0.40
18	0 34.2	4 21 29.69	+22 54 22.9	7.0	2.6	0.19	33	0 38.3	7 26 58.21	+17 55 45.2	15.4	5.9	0.40

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
July 1	0 50.3	7 31 7.25	+18 13 20.4	15.2	5.7	0.39	Aug. 15	23 35.8	9 17 49.24	+17 22 38.8	6.9	2.6	0.18
2	0 44.4	7 29 8.98	18 3 55.3	15.3	5.8	0.40	16	23 40.0	9 25 57.11	16 49 24.5	6.8	2.6	0.17
3	0 38.3	7 26 58.21	17 55 45.2	15.4	5.9	0.40	17	23 44.1	9 34 1.92	16 14 13.4	6.7	2.5	0.17
4	0 31.9	7 24 36.74	17 48 53.0	15.5	5.9	0.40	18	23 48.1	9 42 2.59	15 37 15.4	6.7	2.5	0.17
5	0 25.5	7 22 6.65	17 43 20.9	15.5	5.9	0.40	19	23 52.1	9 49 58.25	14 58 41.3	6.6	2.5	0.17
6	0 19.0	7 19 30.18	+17 39 10.3	15.6	5.8	0.40	20	23 56.0	9 57 48.21	+14 18 41.2	6.6	2.5	0.17
7	0 12.4	7 16 49.78	17 36 22.2	15.5	5.8	0.40	21	23 59.8	10 5 31.96	13 37 24.8	6.5	2.5	0.17
8	0 5.8	7 14 7.99	17 34 56.7	15.5	5.8	0.40	23	0 3.5	10 13 9.09	12 55 1.5	6.5	2.5	0.17
8	23 59.2	7 11 27.42	17 34 53.2	15.4	5.8	0.40	24	0 7.0	10 20 39.30	12 11 40.2	6.5	2.4	0.17
9	23 52.6	7 8 50.73	17 36 10.5	15.3	5.8	0.39	25	0 10.4	10 28 2.50	11 27 29.3	6.5	2.4	0.17
10	23 46.2	7 6 20.56	+17 38 46.7	15.2	5.7	0.39	26	0 13.8	10 35 18.63	+10 42 36.4	6.4	2.4	0.16
11	23 40.0	7 3 59.49	17 42 38.6	15.0	5.7	0.39	27	0 17.0	10 42 27.68	9 57 9.0	6.4	2.4	0.16
12	23 33.9	7 1 49.97	17 47 42.7	14.8	5.6	0.38	28	0 20.1	10 49 29.73	9 11 13.3	6.4	2.4	0.16
13	23 28.0	6 59 54.31	17 53 55.0	14.5	5.5	0.38	29	0 23.0	10 56 24.90	8 24 55.3	6.4	2.4	0.16
14	23 22.4	6 58 14.65	18 1 10.8	14.3	5.4	0.37	30	0 25.9	11 3 13.38	7 38 20.6	6.4	2.4	0.16
15	23 17.1	6 56 52.87	+18 9 24.5	14.0	5.3	0.37	31	0 28.6	11 9 55.35	+6 51 34.3	6.4	2.4	0.16
16	23 12.2	6 55 50.67	18 18 30.2	13.7	5.2	0.36	Sept. 1	0 31.3	11 16 31.03	6 4 40.7	6.4	2.4	0.16
17	23 7.5	6 55 9.55	18 28 21.1	13.4	5.1	0.35	2	0 33.8	11 23 0.65	5 17 44.2	6.4	2.4	0.16
18	23 3.3	6 54 50.77	18 38 50.2	13.1	5.0	0.34	3	0 36.2	11 29 24.42	4 30 48.4	6.5	2.4	0.16
19	22 59.5	6 54 55.35	18 49 49.9	12.8	4.9	0.34	4	0 38.6	11 35 42.59	3 43 56.9	6.5	2.4	0.16
20	22 56.0	6 55 24.11	+19 1 12.4	12.5	4.8	0.33	5	0 40.9	11 41 55.40	+2 57 12.7	6.5	2.5	0.16
21	22 53.0	6 56 17.73	19 12 49.1	12.2	4.6	0.32	6	0 43.1	11 48 3.07	2 10 38.7	6.5	2.5	0.16
22	22 50.4	6 57 36.67	19 24 30.9	11.9	4.5	0.32	7	0 45.2	11 54 5.83	1 24 17.7	6.5	2.5	0.16
23	22 48.2	6 59 21.27	19 36 8.5	11.5	4.4	0.31	8	0 47.2	12 0 3.90	+0 38 12.1	6.5	2.5	0.16
24	22 46.3	7 1 31.71	19 47 32.5	11.2	4.3	0.30	9	0 49.1	12 5 57.49	-0 7 35.8	6.6	2.5	0.16
25	22 45.0	7 4 8.05	+19 58 32.6	10.9	4.2	0.30	10	0 51.0	12 11 46.80	-0 53 3.8	6.6	2.5	0.17
26	22 44.1	7 7 10.24	20 8 58.3	10.6	4.0	0.29	11	0 52.8	12 17 32.02	1 38 10.2	6.6	2.5	0.17
27	22 43.6	7 10 38.08	20 18 38.6	10.3	3.9	0.28	12	0 54.6	12 23 13.33	2 22 53.2	6.7	2.5	0.17
28	22 43.6	7 14 31.28	20 27 22.2	10.0	3.8	0.27	13	0 56.3	12 28 50.89	3 7 10.8	6.7	2.5	0.17
29	22 44.0	7 18 49.43	20 34 58.4	9.8	3.7	0.26	14	0 57.9	12 34 24.85	3 51 1.0	6.8	2.5	0.17
30	22 44.8	7 23 32.01	+20 41 15.4	9.5	3.6	0.26	15	0 59.4	12 39 55.34	-4 34 22.2	6.8	2.6	0.17
31	22 46.0	7 28 38.37	20 46 1.6	9.3	3.5	0.25	16	1 0.9	12 45 22.48	5 17 13.0	6.9	2.6	0.17
Aug. 1	22 47.4	7 34 7.69	20 49 5.7	9.0	3.4	0.24	17	1 2.4	12 50 46.37	5 59 31.8	6.9	2.6	0.17
2	22 49.3	7 39 59.00	20 50 16.6	8.8	3.3	0.23	18	1 3.8	12 56 7.10	6 41 17.1	7.0	2.6	0.17
3	22 51.6	7 46 11.17	20 49 23.7	8.6	3.3	0.23	19	1 5.1	13 1 24.74	7 22 27.2	7.0	2.6	0.17
4	22 54.2	7 52 42.95	+20 46 17.2	8.4	3.2	0.22	20	1 6.4	13 6 39.34	-8 3 0.6	7.1	2.7	0.18
5	22 57.0	7 59 32.90	20 40 48.1	8.2	3.1	0.22	21	1 7.6	13 11 50.93	8 42 55.9	7.1	2.7	0.18
6	23 0.2	8 6 39.40	20 32 49.0	8.0	3.0	0.21	22	1 8.8	13 16 59.51	9 22 11.4	7.2	2.7	0.18
7	23 3.6	8 14 0.66	20 22 14.3	7.8	3.0	0.21	23	1 9.9	13 22 5.06	10 0 45.4	7.3	2.7	0.18
8	23 7.2	8 21 34.83	20 8 59.5	7.6	2.9	0.21	24	1 11.0	13 27 7.54	10 38 36.2	7.3	2.8	0.18
9	23 11.0	8 29 19.92	+19 53 2.5	7.5	2.9	0.20	25	1 12.1	13 32 6.87	-11 15 42.0	7.4	2.8	0.19
10	23 15.0	8 37 13.93	19 34 23.2	7.3	2.8	0.20	26	1 13.1	13 37 2.95	11 52 1.0	7.5	2.8	0.19
11	23 19.1	8 45 14.83	19 13 3.4	7.2	2.8	0.19	27	1 14.1	13 41 55.65	12 27 31.4	7.6	2.8	0.19
12	23 23.2	8 53 20.64	18 49 6.6	7.1	2.7	0.19	28	1 15.0	13 46 44.80	13 2 11.1	7.7	2.9	0.19
13	23 27.4	9 1 29.47	18 22 38.8	7.0	2.7	0.19	29	1 15.8	13 51 30.17	13 35 57.8	7.8	2.9	0.19
14	23 31.6	9 9 39.55	+17 53 46.9	6.9	2.6	0.18	30	1 16.5	13 56 11.49	-14 8 49.1	7.9	3.0	0.20
15	23 35.8	9 17 49.24	+17 22 38.8	6.9	2.6	0.18	31	1 17.1	14 0 48.45	-14 40 42.5	8.0	3.0	0.20



## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Oct. 1	1 17.1	14 0 48.45	-14 40 42.5	8.0	3.0	0.20	Nov. 15	22 30.9	14 15 27.75	-11 4 23.4	9.0	3.4	0.23
2	1 17.7	14 5 20.68	15 11 35.3	8.1	3.0	0.20	16	22 30.7	14 19 14.58	11 25 14.9	8.7	3.3	0.23
3	1 18.3	14 9 47.76	15 41 24.4	8.2	3.1	0.20	17	22 30.8	14 23 20.32	11 48 21.9	8.5	3.2	0.22
4	1 18.7	14 14 9.17	16 10 6.7	8.3	3.1	0.21	18	22 31.3	14 27 42.71	12 13 21.0	8.3	3.1	0.22
5	1 18.9	14 18 24.35	16 37 38.6	8.5	3.2	0.21	19	22 32.0	14 32 19.72	12 39 51.4	8.2	3.1	0.21
6	1 19.1	14 22 32.65	-17 3 56.3	8.6	3.2	0.22	20	22 32.9	14 37 9.60	-13 7 34.3	8.0	3.0	0.21
7	1 19.2	14 26 33.30	17 28 55.7	8.7	3.3	0.22	21	22 34.0	14 42 10.80	13 36 13.0	7.8	3.0	0.20
8	1 19.1	14 30 25.47	17 52 32.0	8.8	3.3	0.23	22	22 35.2	14 47 21.98	14 5 32.8	7.7	2.9	0.20
9	1 18.9	14 34 8.17	18 14 39.8	9.0	3.4	0.23	23	22 36.6	14 52 42.00	14 35 20.4	7.5	2.9	0.20
10	1 18.5	14 37 40.33	18 35 13.5	9.1	3.5	0.24	24	22 38.1	14 58 9.85	15 5 24.2	7.4	2.8	0.19
11	1 17.9	14 41 0.75	-18 54 6.9	9.3	3.5	0.24	25	22 39.8	15 3 44.69	-15 35 34.5	7.3	2.8	0.19
12	1 17.1	14 44 8.07	19 11 13.1	9.5	3.6	0.25	26	22 41.5	15 9 25.79	16 5 42.1	7.2	2.8	0.19
13	1 16.1	14 47 0.80	19 26 23.8	9.7	3.7	0.25	27	22 43.3	15 15 12.50	16 35 39.1	7.1	2.7	0.19
14	1 14.7	14 49 37.29	19 39 30.5	9.9	3.7	0.26	28	22 45.2	15 21 4.29	17 5 18.5	7.0	2.7	0.18
15	1 13.1	14 51 55.75	19 50 23.5	10.1	3.8	0.27	29	22 47.2	15 27 0.75	17 34 34.2	6.9	2.6	0.18
16	1 11.2	14 53 54.26	-19 58 52.0	10.3	3.9	0.27	30	22 49.3	15 33 1.50	-18 3 20.9	6.9	2.6	0.18
17	1 8.9	14 55 30.75	20 4 44.0	10.6	4.0	0.28	Dec. 1	22 51.4	15 39 6.21	18 31 33.6	6.8	2.6	0.18
18	1 6.1	14 56 43.10	20 7 46.9	10.8	4.1	0.28	2	22 53.6	15 45 14.61	18 59 8.2	6.8	2.6	0.18
19	1 2.9	14 57 29.09	20 7 46.6	11.0	4.2	0.29	3	22 55.9	15 51 26.46	19 26 0.6	6.7	2.5	0.18
20	0 59.3	14 57 46.57	20 4 28.2	11.3	4.3	0.30	4	22 58.2	15 57 41.57	19 52 7.6	6.6	2.5	0.17
21	0 55.2	14 57 33.52	-19 57 36.5	11.5	4.4	0.30	5	23 0.5	16 3 59.78	-20 17 25.8	6.6	2.5	0.17
22	0 50.5	14 56 48.19	19 46 56.5	11.8	4.5	0.31	6	23 2.9	16 10 20.95	20 41 52.2	6.5	2.5	0.17
23	0 45.2	14 55 29.23	19 32 14.1	12.0	4.6	0.31	7	23 5.3	16 16 44.95	21 5 24.5	6.5	2.5	0.17
24	0 39.4	14 53 35.96	19 13 18.0	12.3	4.7	0.32	8	23 7.8	16 23 11.69	21 28 0.1	6.5	2.4	0.17
25	0 33.0	14 51 8.55	18 50 0.5	12.5	4.7	0.33	9	23 10.4	16 29 41.06	21 49 36.7	6.4	2.4	0.17
26	0 26.1	14 48 8.23	-18 22 20.2	12.7	4.8	0.33	10	23 12.9	16 36 12.99	-22 10 12.3	6.4	2.4	0.17
27	0 18.7	14 44 37.54	17 50 25.0	12.9	4.9	0.34	11	23 15.6	16 42 47.41	22 29 45.0	6.3	2.4	0.17
28	0 10.8	14 40 40.47	17 14 33.2	13.0	4.9	0.34	12	23 18.3	16 49 24.23	22 48 12.7	6.3	2.4	0.17
29	0 2.5	14 36 22.44	16 35 16.1	13.1	4.9	0.34	13	23 21.0	16 56 3.41	23 5 33.6	6.3	2.4	0.17
29	23 54.1	14 31 50.33	15 53 17.1	13.1	5.0	0.35	14	23 23.7	17 2 44.88	23 21 46.2	6.2	2.4	0.17
30	23 45.6	14 27 12.01	-15 9 33.2	13.1	4.9	0.34	15	23 26.5	17 9 28.58	-23 36 48.8	6.2	2.3	0.17
31	23 37.1	14 22 36.09	14 25 12.1	13.0	4.9	0.34	16	23 29.3	17 16 14.46	23 50 39.7	6.2	2.3	0.17
Nov. 1	23 28.7	14 18 11.37	13 41 27.6	13.0	4.8	0.33	17	23 32.1	17 23 2.46	24 3 17.6	6.2	2.3	0.17
2	23 20.6	14 14 6.18	12 59 34.2	12.8	4.8	0.33	18	23 35.0	17 29 52.52	24 14 40.9	6.2	2.3	0.17
3	23 13.1	14 10 27.97	12 20 42.3	12.6	4.7	0.32	19	23 37.9	17 36 44.56	24 24 48.0	6.2	2.3	0.17
4	23 6.1	14 7 22.82	-11 45 52.8	12.3	4.6	0.32	20	23 40.9	17 43 38.52	-24 33 37.6	6.1	2.3	0.17
5	22 59.7	14 4 55.21	11 15 53.4	12.0	4.5	0.31	21	23 43.9	17 50 34.31	24 41 8.5	6.1	2.3	0.17
6	22 54.0	14 3 8.05	10 51 16.8	11.7	4.4	0.30	22	23 46.9	17 57 31.87	24 47 19.3	6.1	2.3	0.17
7	22 49.0	14 2 2.62	10 32 21.2	11.4	4.3	0.29	23	23 49.9	18 4 31.12	24 52 8.6	6.1	2.3	0.17
8	22 44.7	14 1 38.91	10 19 10.8	11.0	4.2	0.28	24	23 53.0	18 11 31.95	24 55 35.1	6.1	2.3	0.17
9	22 41.0	14 1 55.72	-10 11 38.4	10.7	4.0	0.27	25	23 56.1	18 18 34.29	-24 57 37.6	6.1	2.3	0.17
10	22 38.0	14 2 51.01	10 9 28.4	10.4	3.9	0.26	26	23 59.2	18 25 38.01	24 58 14.8	6.1	2.3	0.17
11	22 35.5	14 4 22.26	10 12 18.2	10.1	3.8	0.25	28	0 2.4	18 32 42.97	24 57 25.6	6.1	2.3	0.17
12	22 33.6	14 6 26.58	10 19 41.2	9.8	3.7	0.25	29	0 5.5	18 39 49.10	24 55 8.9	6.2	2.3	0.17
13	22 32.3	14 9 0.93	10 31 8.8	9.5	3.6	0.24	30	0 8.7	18 46 56.27	24 51 23.5	6.2	2.3	0.17
14	22 31.4	14 12 2.28	-10 46 12.3	9.2	3.5	0.23	31	0 11.8	18 54 4.33	-24 46 8.4	6.2	2.3	0.17
15	22 30.9	14 15 27.75	-11 4 23.4	9.0	3.4	0.23	32	0 15.0	19 1 13.10	-24 39 22.5	6.2	2.3	0.17

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	20 55.5	15 38 7.83	-16 41 36.8	9.8	9.4	0.66	Feb. 15	21 46.0	19 30 5.90	-21 10 24.6	7.3	7.0	0.50
1	20 56.2	15 42 47.82	16 58 24.7	9.7	9.3	0.65	16	21 47.2	19 35 16.52	21 2 21.0	7.2	7.0	0.50
2	20 56.9	15 47 29.26	17 14 53.2	9.6	9.3	0.65	17	21 48.4	19 40 26.66	20 53 40.4	7.2	7.0	0.50
3	20 57.7	15 52 12.12	17 31 1.5	9.6	9.2	0.65	18	21 49.6	19 45 36.30	20 44 23.1	7.1	6.9	0.49
4	20 58.5	15 56 56.39	17 46 48.7	9.5	9.2	0.64	19	21 50.8	19 50 45.38	20 34 29.6	7.1	6.9	0.49
5	20 59.3	16 1 42.05	-18 2 13.9	9.4	9.1	0.64	20	21 52.0	19 55 53.87	-20 24 0.0	7.1	6.9	0.49
6	21 0.2	16 6 29.09	18 17 16.4	9.3	9.0	0.63	21	21 53.2	20 1 1.73	20 12 54.6	7.0	6.8	0.48
7	21 1.0	16 11 17.49	18 31 55.4	9.2	9.0	0.63	22	21 54.4	20 6 8.93	20 1 14.0	7.0	6.8	0.48
8	21 1.9	16 16 7.22	18 46 10.0	9.2	8.9	0.63	23	21 55.6	20 11 15.43	19 48 58.5	7.0	6.8	0.48
9	21 2.8	16 20 58.25	18 59 59.5	9.1	8.8	0.62	24	21 56.7	20 16 21.20	19 36 8.4	6.9	6.7	0.47
10	21 3.7	16 25 50.57	-19 13 23.1	9.0	8.7	0.62	25	21 57.8	20 21 26.23	-19 22 44.3	6.9	6.7	0.47
11	21 4.6	16 30 44.14	19 26 20.0	9.0	8.7	0.61	26	21 58.9	20 26 30.49	19 8 46.4	6.9	6.7	0.47
12	21 5.6	16 35 38.93	19 38 49.6	8.9	8.6	0.61	27	22 0.0	20 31 33.93	18 54 15.2	6.8	6.6	0.47
13	21 6.6	16 40 34.91	19 50 51.2	8.8	8.5	0.61	28	22 1.1	20 36 36.54	18 39 11.3	6.8	6.6	0.46
14	21 7.6	16 45 32.05	20 2 24.0	8.8	8.5	0.60	29	22 2.2	20 41 38.31	18 23 35.2	6.8	6.6	0.46
15	21 8.6	16 50 30.32	-20 13 27.3	8.7	8.4	0.60	Mar. 1	22 3.3	20 46 39.23	-18 7 27.4	6.8	6.5	0.46
16	21 9.7	16 55 29.68	20 24 0.4	8.7	8.4	0.60	2	22 4.3	20 51 39.27	17 50 48.3	6.7	6.5	0.46
17	21 10.7	17 0 30.08	20 34 2.8	8.6	8.3	0.59	3	22 5.4	20 56 38.40	17 33 38.7	6.7	6.5	0.45
18	21 11.8	17 5 31.50	20 43 33.9	8.5	8.3	0.59	4	22 6.4	21 1 36.61	17 15 59.0	6.7	6.4	0.45
19	21 12.9	17 10 33.92	20 52 33.0	8.5	8.2	0.59	5	22 7.4	21 6 33.89	16 57 49.7	6.6	6.4	0.45
20	21 14.0	17 15 37.28	-21 0 59.7	8.4	8.2	0.58	6	22 8.4	21 11 30.24	-16 39 11.5	6.6	6.4	0.44
21	21 15.2	17 20 41.56	21 8 53.4	8.4	8.1	0.58	7	22 9.4	21 16 25.04	16 20 5.0	6.6	6.4	0.44
22	21 16.4	17 25 46.70	21 16 13.6	8.3	8.1	0.58	8	22 10.4	21 21 20.08	16 0 30.8	6.6	6.3	0.44
23	21 17.5	17 30 52.67	21 22 59.8	8.3	8.0	0.57	9	22 11.4	21 26 13.56	15 40 29.5	6.5	6.3	0.44
24	21 18.7	17 35 59.42	21 29 11.5	8.2	7.9	0.57	10	22 12.3	21 31 6.07	15 20 1.9	6.5	6.3	0.43
25	21 19.9	17 41 6.91	-21 34 48.4	8.2	7.9	0.57	11	22 13.2	21 35 57.62	-14 59 8.6	6.5	6.3	0.43
26	21 21.1	17 46 15.11	21 39 50.0	8.1	7.8	0.56	12	22 14.1	21 40 48.20	14 37 50.0	6.4	6.2	0.43
27	21 22.3	17 51 23.97	21 44 15.8	8.1	7.8	0.56	13	22 15.0	21 45 37.82	14 16 7.0	6.4	6.2	0.43
28	21 23.5	17 56 33.43	21 48 5.5	8.0	7.7	0.56	14	22 15.8	21 50 26.48	13 54 0.2	6.4	6.2	0.42
29	21 24.7	18 1 43.44	21 51 18.9	8.0	7.7	0.55	15	22 16.7	21 55 14.19	13 31 30.2	6.4	6.2	0.42
30	21 25.9	18 6 53.96	-21 53 55.6	7.9	7.7	0.55	16	22 17.5	22 0 0.96	-13 8 37.7	6.3	6.1	0.42
31	21 27.1	18 12 4.94	21 55 55.3	7.9	7.6	0.55	17	22 18.3	22 4 46.80	12 45 23.5	6.3	6.1	0.42
Feb. 1	21 28.4	18 17 16.31	21 57 17.9	7.8	7.6	0.54	18	22 19.1	22 9 31.73	12 21 48.1	6.3	6.1	0.42
2	21 29.6	18 22 28.04	21 58 3.1	7.8	7.5	0.54	19	22 19.9	22 14 15.76	11 57 52.4	6.3	6.1	0.41
3	21 30.9	18 27 40.06	21 58 10.6	7.8	7.5	0.54	20	22 20.7	22 18 58.91	11 33 37.0	6.2	6.0	0.41
4	21 32.1	18 32 52.32	-21 57 40.4	7.7	7.4	0.54	21	22 21.4	22 23 41.20	-11 9 2.6	6.2	6.0	0.41
5	21 33.4	18 38 4.74	21 56 32.3	7.7	7.4	0.53	22	22 22.1	22 28 22.66	10 44 9.7	6.2	6.0	0.41
6	21 34.6	18 43 17.27	21 54 46.2	7.6	7.4	0.53	23	22 22.9	22 33 3.31	10 18 59.1	6.2	6.0	0.41
7	21 35.9	18 48 29.66	21 52 22.2	7.6	7.3	0.53	24	22 23.6	22 37 43.17	9 53 31.5	6.2	5.9	0.40
8	21 37.2	18 53 42.46	21 49 20.2	7.5	7.3	0.52	25	22 24.3	22 42 22.27	9 27 47.5	6.1	5.9	0.40
9	21 38.5	18 58 55.00	-21 45 40.0	7.5	7.2	0.52	26	22 25.0	22 47 0.63	-9 1 47.8	6.1	5.9	0.40
10	21 39.8	19 4 7.42	21 41 21.8	7.5	7.2	0.52	27	22 25.7	22 51 38.29	8 35 33.1	6.1	5.9	0.40
11	21 41.0	19 9 19.67	21 36 25.7	7.4	7.2	0.51	28	22 26.4	22 56 15.27	8 9 4.1	6.1	5.9	0.40
12	21 42.2	19 14 31.70	21 30 51.8	7.4	7.1	0.51	29	22 27.1	23 0 51.61	7 42 21.4	6.1	5.8	0.39
13	21 43.5	19 19 43.45	21 24 40.2	7.3	7.1	0.51	30	22 27.7	23 5 27.33	7 15 25.7	6.0	5.8	0.39
14	21 44.8	19 24 54.86	-21 17 51.1	7.3	7.0	0.51	31	22 28.3	23 10 2.47	-6 48 17.9	6.0	5.8	0.39
15	21 46.0	19 30 5.90	-21 10 24.6	7.3	7.0	0.50	32	22 28.9	23 14 37.06	-6 20 58.5	6.0	5.8	0.39

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	22 28.9	23 14 37.06	- 6 20 58.5	6.0	5.8	0.39	May 17	22 58.3	2 45 22.46	+14 44 56.9	5.3	5.2	0.36
2	22 29.5	23 19 11.13	5 53 28.2	6.0	5.8	0.39	18	22 59.1	2 50 11.01	15 8 17.1	5.3	5.2	0.36
3	22 30.2	23 23 44.72	5 25 47.7	6.0	5.8	0.39	19	23 0.0	2 55 0.61	15 31 15.1	5.3	5.1	0.36
4	22 30.8	23 28 17.85	4 57 57.6	5.9	5.7	0.39	20	23 0.9	2 59 51.26	15 53 50.3	5.3	5.1	0.36
5	22 31.4	23 32 50.56	4 29 58.6	5.9	5.7	0.38	21	23 1.8	3 4 42.98	16 16 2.0	5.3	5.1	0.36
6	22 32.0	23 37 22.88	- 4 1 51.6	5.9	5.7	0.38	22	23 2.7	3 9 35.79	+16 37 49.4	5.3	5.1	0.36
7	22 32.6	23 41 54.83	3 33 37.1	5.9	5.7	0.38	23	23 3.7	3 14 29.69	16 59 11.9	5.3	5.1	0.36
8	22 33.2	23 46 26.46	3 5 15.9	5.9	5.7	0.38	24	23 4.7	3 19 24.70	17 20 8.6	5.3	5.1	0.36
9	22 33.8	23 50 57.79	2 36 48.7	5.9	5.7	0.38	25	23 5.7	3 24 20.85	17 40 39.0	5.3	5.1	0.36
10	22 34.4	23 55 28.87	2 8 16.1	5.9	5.6	0.38	26	23 6.7	3 29 18.13	18 0 42.3	5.3	5.1	0.36
11	22 34.9	23 59 59.73	- 1 39 39.0	5.8	5.6	0.38	27	23 7.7	3 34 16.55	+18 20 17.8	5.3	5.1	0.36
12	22 35.5	0 4 30.40	1 10 58.0	5.8	5.6	0.37	28	23 8.7	3 39 16.10	18 39 24.8	5.2	5.1	0.36
13	22 36.0	0 9 0.92	0 42 13.7	5.8	5.6	0.37	29	23 9.8	3 44 16.79	18 58 2.8	5.2	5.1	0.36
14	22 36.6	0 13 31.33	- 0 13 26.8	5.8	5.6	0.37	30	23 10.9	3 49 18.61	19 16 10.9	5.2	5.1	0.36
15	22 37.2	0 18 1.66	+ 0 15 21.9	5.8	5.6	0.37	31	23 12.0	3 54 21.56	19 33 48.6	5.2	5.1	0.36
16	22 37.8	0 22 31.95	+ 0 44 11.8	5.7	5.5	0.37	June 1	23 13.2	3 59 25.62	+19 50 55.1	5.2	5.0	0.36
17	22 38.3	0 27 2.24	1 13 2.1	5.7	5.5	0.37	2	23 14.4	4 4 30.79	20 7 29.8	5.2	5.0	0.36
18	22 38.9	0 31 32.58	1 41 52.3	5.7	5.5	0.37	3	23 15.5	4 9 37.06	20 23 32.1	5.2	5.0	0.36
19	22 39.4	0 36 3.00	2 10 41.6	5.7	5.5	0.37	4	23 16.7	4 14 44.41	20 39 1.3	5.2	5.0	0.36
20	22 40.0	0 40 33.54	2 39 29.3	5.7	5.5	0.37	5	23 17.9	4 19 52.81	20 53 56.7	5.2	5.0	0.36
21	22 40.5	0 45 4.23	+ 3 8 14.7	5.7	5.5	0.36	6	23 19.1	4 25 2.25	+21 8 17.8	5.2	5.0	0.36
22	22 41.1	0 49 35.13	3 36 57.2	5.6	5.4	0.36	7	23 20.3	4 30 12.69	21 22 3.9	5.2	5.0	0.36
23	22 41.7	0 54 6.27	4 5 36.0	5.6	5.4	0.36	8	23 21.5	4 35 24.12	21 35 14.6	5.2	5.0	0.36
24	22 42.3	0 58 37.70	4 34 10.5	5.6	5.4	0.36	9	23 22.7	4 40 36.50	21 47 49.3	5.2	5.0	0.36
25	22 42.8	1 3 9.46	5 2 40.2	5.6	5.4	0.36	10	23 24.0	4 45 49.81	21 59 47.4	5.2	5.0	0.36
26	22 43.4	1 7 41.57	+ 5 31 4.2	5.6	5.4	0.36	11	23 25.3	4 51 4.01	+22 11 8.4	5.2	5.0	0.36
27	22 44.0	1 12 14 09	5 59 21.8	5.6	5.1	0.36	12	23 26.6	4 56 19.04	22 21 51.7	5.2	5.0	0.36
28	22 44.6	1 16 47.06	6 27 32.4	5.6	5.4	0.36	13	23 27.9	5 1 34.89	22 31 56.9	5.2	5.0	0.36
29	22 45.2	1 21 20.51	6 55 35.3	5.5	5.4	0.36	14	23 29.3	5 6 51.51	22 41 23.5	5.1	5.0	0.36
30	22 45.8	1 25 54.47	7 23 29.8	5.5	5.3	0.36	15	23 30.6	5 12 8.85	22 50 11.0	5.1	5.0	0.36
May 1	22 46.5	1 30 28.99	+ 7 51 15.2	5.5	5.3	0.36	16	23 32.0	5 17 26.86	+22 58 19.2	5.1	5.0	0.36
2	22 47.1	1 35 4.10	8 18 50.7	5.5	5.3	0.36	17	23 33.3	5 22 45.52	23 5 47.6	5.1	5.0	0.36
3	22 47.8	1 39 39.83	8 46 15.7	5.5	5.3	0.36	18	23 34.7	5 28 4.78	23 12 35.9	5.1	5.0	0.36
4	22 48.4	1 44 16.22	9 13 29.5	5.5	5.3	0.36	19	23 36.1	5 33 24.58	23 18 43.7	5.1	5.0	0.36
5	22 49.1	1 48 53.30	9 40 31.3	5.5	5.3	0.36	20	23 37.5	5 38 44.88	23 24 10.6	5.1	5.0	0.36
6	22 49.8	1 53 31.10	+10 7 20.5	5.5	5.3	0.36	21	23 38.9	5 44 5.62	+23 28 56.5	5.1	5.0	0.36
7	22 50.5	1 58 9.65	10 33 56.2	5.4	5.3	0.36	22	23 40.3	5 49 26.78	23 33 1.1	5.1	5.0	0.36
8	22 51.2	2 2 48.98	11 0 17.9	5.4	5.3	0.36	23	23 41.7	5 54 48.24	23 36 24.1	5.1	5.0	0.36
9	22 51.9	2 7 29.12	11 26 24.7	5.4	5.2	0.36	24	23 43.1	6 0 10.01	23 39 5.3	5.1	4.9	0.36
10	22 52.7	2 12 10.10	11 52 15.9	5.4	5.2	0.36	25	23 44.5	6 5 32.02	23 41 4.7	5.1	4.9	0.36
11	22 53.5	2 16 51.94	+12 17 50.8	5.4	5.2	0.36	26	23 45.9	6 10 54.21	+23 42 22.1	5.1	4.9	0.36
12	22 54.2	2 21 34.67	12 43 8.7	5.4	5.2	0.36	27	23 47.3	6 16 16.52	23 42 57.5	5.1	4.9	0.36
13	22 55.0	2 26 18.31	13 8 8.9	5.4	5.2	0.36	28	23 48.8	6 21 38.90	23 42 50.7	5.1	4.9	0.36
14	22 55.8	2 31 2.88	13 32 50.5	5.4	5.2	0.36	29	23 50.2	6 27 1.29	23 42 1.6	5.1	4.9	0.36
15	22 56.6	2 35 48.41	13 57 12.8	5.4	5.2	0.36	30	23 51.6	6 32 23.63	23 40 30.2	5.1	4.9	0.36
16	22 57.4	2 40 34.93	+14 21 15.2	5.3	5.2	0.36	31	23 53.0	6 37 45.87	+23 38 16.5	5.1	4.9	0.36
17	22 58.3	2 45 22.46	+14 44 56.9	5.3	5.2	0.36	32	23 54.5	6 43 7.94	+23 35 20.7	5.1	4.9	0.36

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
July 1	23 53.0	6 37 45.87	+23 38 16.5	5.1	4.9	0.36	Aug. 17	0 44.8	10 30 57.32	+10 52 49.6	5.2	5.0	0.34
2	23 54.5	6 43 7.94	23 35 20.7	5.1	4.9	0.36	18	0 45.5	10 35 37.57	10 25 18.7	5.2	5.0	0.34
3	23 55.9	6 48 29.79	23 31 42.7	5.1	4.9	0.36	19	0 46.2	10 40 16.95	9 57 31.1	5.2	5.1	0.34
4	23 57.3	6 53 51.36	23 27 22.7	5.1	4.9	0.36	20	0 46.9	10 44 55.50	9 29 27.6	5.2	5.1	0.34
5	23 58.7	6 59 12.61	23 22 20.9	5.1	4.9	0.36	21	0 47.6	10 49 33.26	9 1 8.8	5.3	5.1	0.34
7	0 0.2	7 4 33.45	+23 16 37.4	5.1	4.9	0.36	22	0 48.4	10 54 10.26	+ 8 32 35.5	5.3	5.1	0.34
8	0 1.6	7 9 53.84	23 10 12.5	5.1	4.9	0.36	23	0 49.1	10 58 46.54	8 3 48.3	5.3	5.1	0.34
9	0 3.0	7 15 13.72	23 3 6.3	5.1	4.9	0.36	24	0 49.8	11 3 22.13	7 34 48.2	5.3	5.1	0.34
10	0 4.4	7 20 33.04	22 55 19.1	5.1	4.9	0.36	25	0 50.4	11 7 57.08	7 5 35.8	5.3	5.1	0.34
11	0 5.7	7 25 51.75	22 46 51.2	5.1	4.9	0.36	26	0 51.0	11 12 31.42	6 36 11.6	5.3	5.1	0.34
12	0 7.1	7 31 9.80	+22 37 42.9	5.1	4.9	0.36	27	0 51.6	11 17 5.19	+ 6 6 36.5	5.3	5.1	0.34
13	0 8.4	7 36 27.14	22 27 54.6	5.1	4.9	0.36	28	0 52.2	11 21 38.42	5 36 51.1	5.3	5.1	0.34
14	0 9.7	7 41 43.73	22 17 26.7	5.1	4.9	0.36	29	0 52.8	11 26 11.17	5 6 56.3	5.3	5.1	0.34
15	0 11.0	7 46 59.51	22 6 10.5	5.1	4.9	0.35	30	0 53.4	11 30 43.46	4 36 52.7	5.3	5.1	0.35
16	0 12.3	7 52 14.47	21 54 33.5	5.1	4.9	0.35	31	0 54.0	11 35 15.34	4 6 41.1	5.3	5.2	0.35
17	0 13.5	7 57 28.55	+21 42 9.1	5.1	4.9	0.35	Sept. 1	0 54.5	11 39 46.86	+ 3 36 22.1	5.3	5.2	0.35
18	0 14.8	8 2 41.70	21 29 6.7	5.1	4.9	0.35	2	0 55.1	11 44 18.05	3 5 56.5	5.4	5.2	0.35
19	0 16.0	8 7 53.91	21 15 26.8	5.1	4.9	0.35	3	0 55.6	11 48 48.95	2 35 25.0	5.4	5.2	0.35
20	0 17.3	8 13 5.14	21 1 10.0	5.1	4.9	0.35	4	0 56.2	11 53 19.60	2 4 48.4	5.4	5.2	0.35
21	0 18.5	8 18 15.37	20 46 16.7	5.1	4.9	0.35	5	0 56.7	11 57 50.04	1 34 7.3	5.4	5.2	0.35
22	0 19.8	8 23 24.58	+20 30 47.6	5.1	4.9	0.35	6	0 57.3	12 2 20.32	+ 1 3 22.5	5.4	5.2	0.35
23	0 21.0	8 28 32.74	20 14 43.2	5.1	4.9	0.35	7	0 57.9	12 6 50.46	0 32 34.8	5.4	5.2	0.35
24	0 22.2	8 33 39.82	19 58 4.1	5.1	4.9	0.35	8	0 58.5	12 11 20.51	+ 0 1 45.0	5.4	5.2	0.35
25	0 23.4	8 38 45.82	19 40 50.8	5.1	5.0	0.35	9	0 59.0	12 15 50.51	- 0 29 6.4	5.4	5.2	0.35
26	0 24.5	8 43 50.73	19 23 3.9	5.1	5.0	0.35	10	0 59.6	12 20 20.51	0 59 58.5	5.4	5.2	0.35
27	0 25.6	8 48 54.52	+19 4 44.1	5.1	5.0	0.35	11	1 0.1	12 24 50.54	- 1 30 50.6	5.4	5.3	0.35
28	0 26.7	8 53 57.20	18 45 52.0	5.1	5.0	0.35	12	1 0.7	12 29 20.66	2 1 42.0	5.5	5.3	0.35
29	0 27.8	8 58 58.75	18 26 28.1	5.1	5.0	0.35	13	1 1.2	12 33 50.90	2 32 32.0	5.5	5.3	0.35
30	0 28.9	9 3 59.17	18 6 33.2	5.1	5.0	0.35	14	1 1.8	12 38 21.29	3 3 19.7	5.5	5.3	0.35
31	0 29.9	9 8 58.44	17 46 7.9	5.1	5.0	0.35	15	1 2.3	12 42 51.89	3 34 4.4	5.5	5.3	0.35
Aug. 1	0 31.0	9 13 56.58	+17 25 12.9	5.1	5.0	0.35	16	1 2.9	12 47 22.75	- 4 4 45.5	5.5	5.3	0.35
2	0 32.0	9 18 53.58	17 3 48.9	5.1	5.0	0.35	17	1 3.5	12 51 53.89	4 35 22.2	5.5	5.3	0.36
3	0 33.0	9 23 49.44	16 41 56.6	5.1	5.0	0.35	18	1 4.1	12 56 25.36	5 5 53.8	5.5	5.3	0.36
4	0 34.0	9 28 44.17	16 19 36.7	5.2	5.0	0.35	19	1 4.6	13 0 57.21	5 36 19.5	5.5	5.4	0.36
5	0 35.0	9 33 37.78	15 56 49.8	5.2	5.0	0.35	20	1 5.2	13 5 29.48	6 6 38.5	5.6	5.4	0.36
6	0 35.9	9 38 30.26	+15 33 36.6	5.2	5.0	0.35	21	1 5.8	13 10 2.22	- 6 36 50.1	5.6	5.4	0.36
7	0 36.8	9 43 21.62	15 9 58.0	5.2	5.0	0.35	22	1 6.4	13 14 35.47	7 6 53.6	5.6	5.4	0.36
8	0 37.7	9 48 11.88	14 45 54.6	5.2	5.0	0.35	23	1 7.0	13 19 9.27	7 36 48.2	5.6	5.4	0.36
9	0 38.6	9 53 1.06	14 21 27.1	5.2	5.0	0.34	24	1 7.6	13 23 43.66	8 6 33.4	5.6	5.4	0.36
10	0 39.4	9 57 49.16	13 56 36.3	5.2	5.0	0.34	25	1 8.3	13 28 18.67	8 36 8.3	5.6	5.4	0.37
11	0 40.2	10 2 36.19	+13 31 22.9	5.2	5.0	0.34	26	1 8.9	13 32 54.36	- 9 5 32.1	5.6	5.4	0.37
12	0 41.0	10 7 22.19	13 5 47.7	5.2	5.0	0.34	27	1 9.6	13 37 30.78	9 34 44.2	5.6	5.5	0.37
13	0 41.8	10 12 7.16	12 39 51.4	5.2	5.0	0.34	28	1 10.3	13 42 7.96	10 3 43.8	5.7	5.5	0.37
14	0 42.6	10 16 51.13	12 13 34.7	5.2	5.0	0.34	29	1 11.0	13 46 45.93	10 32 30.1	5.7	5.5	0.37
15	0 43.3	10 21 34.13	11 46 58.3	5.2	5.0	0.34	30	1 11.7	13 51 24.73	11 1 2.3	5.7	5.5	0.37
16	0 44.0	10 26 16.19	+11 20 3.0	5.2	5.0	0.34	31	1 12.4	13 56 4.39	-11 29 19.5	5.7	5.5	0.38
17	0 44.8	10 30 57.32	+10 52 49.6	5.2	5.0	0.34	32	1 13.2	14 0 44.95	-11 57 21.2	5.7	5.5	0.38

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	"		h m	h m s	° ' "	"	"	"
Oct. 1	1 12.4	13 56 4.39	-11 29 19.5	5.7	5.5	0.38	Nov. 16	2 4.8	17 49 53.50	-25 2 25.3	6.7	6.4	0.48
2	1 13.2	14 0 44.95	11 57 21.2	5.7	5.5	0.38	17	2 6.2	17 55 18.27	25 5 18.8	6.7	6.5	0.48
3	1 14.0	14 5 26.43	12 25 6.5	5.7	5.5	0.38	18	2 7.7	18 0 43.13	25 7 27.3	6.7	6.5	0.48
4	1 14.7	14 10 8.87	12 52 34.6	5.8	5.6	0.38	19	2 9.1	18 6 8.04	25 8 50.8	6.8	6.5	0.48
5	1 15.5	14 14 52.30	13 19 44.7	5.8	5.6	0.38	20	2 10.6	18 11 32.92	25 9 29.1	6.8	6.6	0.48
6	1 16.3	14 19 36.75	-13 46 36.0	5.8	5.6	0.38	21	2 12.0	18 16 57.70	-25 9 22.2	6.8	6.6	0.49
7	1 17.1	14 24 22.24	14 13 7.8	5.8	5.6	0.39	22	2 13.5	18 22 22.30	25 8 30.3	6.9	6.6	0.49
8	1 17.9	14 29 8.80	14 39 19.3	5.8	5.6	0.39	23	2 14.9	18 27 46.67	25 6 53.2	6.9	6.6	0.49
9	1 18.8	14 33 56.45	15 5 9.6	5.8	5.6	0.39	24	2 16.4	18 33 10.73	25 4 30.9	6.9	6.7	0.49
10	1 19.6	14 38 45.20	15 30 37.8	5.9	5.7	0.39	25	2 17.8	18 38 34.41	25 1 23.5	6.9	6.7	0.49
11	1 20.5	14 43 35.07	-15 55 43.3	5.9	5.7	0.39	26	2 19.3	18 43 57.66	-24 57 31.3	7.0	6.7	0.50
12	1 21.4	14 48 26.09	16 20 25.2	5.9	5.7	0.40	27	2 20.7	18 49 20.41	24 52 54.6	7.0	6.8	0.50
13	1 22.3	14 53 18.27	16 44 42.7	5.9	5.7	0.40	28	2 22.2	18 54 42.57	24 47 33.5	7.0	6.8	0.50
14	1 23.2	14 58 11.63	17 8 35.0	5.9	5.7	0.40	29	2 23.6	19 0 4.09	24 41 28.2	7.1	6.8	0.50
15	1 24.2	15 3 6.17	17 32 1.3	5.9	5.8	0.40	30	2 25.0	19 5 24.90	24 34 39.0	7.1	6.9	0.50
16	1 25.2	15 8 1.91	-17 55 1.0	6.0	5.8	0.40	Dec. 1	2 26.4	19 10 44.95	-24 27 6.0	7.1	6.9	0.51
17	1 26.2	15 12 58.86	18 17 33.1	6.0	5.8	0.41	2	2 27.8	19 16 4.17	24 18 49.9	7.2	6.9	0.51
18	1 27.2	15 17 57.03	18 39 36.9	6.0	5.8	0.41	3	2 29.2	19 21 22.47	24 9 50.9	7.2	7.0	0.51
19	1 28.3	15 22 56.43	19 1 11.6	6.0	5.8	0.41	4	2 30.5	19 26 39.81	24 0 9.4	7.2	7.0	0.51
20	1 29.3	15 27 57.04	19 22 16.5	6.0	5.8	0.41	5	2 31.8	19 31 56.14	23 49 45.8	7.3	7.0	0.51
21	1 30.4	15 32 58.88	-19 42 50.9	6.1	5.9	0.42	6	2 33.1	19 37 11.38	-23 38 40.7	7.3	7.1	0.52
22	1 31.5	15 38 1.95	20 2 53.9	6.1	5.9	0.42	7	2 34.4	19 42 25.49	23 26 54.5	7.4	7.1	0.52
23	1 32.6	15 43 6.26	20 22 24.8	6.1	5.9	0.42	8	2 35.7	19 47 38.42	23 14 27.8	7.4	7.2	0.52
24	1 33.8	15 48 11.78	20 41 22.9	6.1	5.9	0.42	9	2 37.0	19 52 50.11	23 1 21.0	7.4	7.2	0.52
25	1 35.0	15 53 18.51	20 59 47.6	6.1	5.9	0.42	10	2 38.2	19 58 0.52	22 47 34.7	7.5	7.2	0.52
26	1 36.2	15 58 26.43	-21 17 38.0	6.2	6.0	0.43	11	2 39.4	20 3 9.60	-22 33 9.6	7.5	7.3	0.52
27	1 37.4	16 3 35.53	21 34 53.5	6.2	6.0	0.43	12	2 40.5	20 8 17.31	22 18 6.3	7.5	7.3	0.53
28	1 38.6	16 8 45.80	21 51 33.4	6.2	6.0	0.43	13	2 41.7	20 13 23.61	22 2 25.4	7.6	7.3	0.53
29	1 39.9	16 13 57.22	22 7 37.0	6.2	6.0	0.43	14	2 42.8	20 18 28.46	21 46 7.6	7.6	7.4	0.53
30	1 41.1	16 19 9.76	22 23 3.8	6.3	6.0	0.44	15	2 43.9	20 23 31.84	21 29 13.5	7.7	7.4	0.53
31	1 42.4	16 24 23.39	-22 37 53.0	6.3	6.1	0.44	16	2 45.0	20 28 33.72	-21 11 43.7	7.7	7.5	0.53
Nov. 1	1 43.7	16 29 38.07	22 52 4.1	6.3	6.1	0.44	17	2 46.1	20 33 34.08	20 53 39.0	7.8	7.5	0.53
2	1 45.0	16 34 53.78	23 5 36.3	6.3	6.1	0.44	18	2 47.1	20 38 32.90	20 35 0.2	7.8	7.5	0.54
3	1 46.3	16 40 10.46	23 18 29.0	6.3	6.1	0.44	19	2 48.1	20 43 30.16	20 15 47.9	7.8	7.6	0.54
4	1 47.7	16 45 28.08	23 30 41.8	6.4	6.2	0.45	20	2 49.1	20 48 25.83	19 56 2.8	7.9	7.6	0.54
5	1 49.0	16 50 46.60	-23 42 14.1	6.4	6.2	0.45	21	2 50.1	20 53 19.92	-19 35 45.8	7.9	7.7	0.54
6	1 50.4	16 56 5.97	23 53 5.4	6.4	6.2	0.45	22	2 51.0	20 58 12.41	19 14 57.6	8.0	7.7	0.54
7	1 51.8	17 1 26.13	24 3 15.1	6.4	6.2	0.45	23	2 51.9	21 3 3.29	18 53 38.9	8.0	7.7	0.55
8	1 53.2	17 6 47.02	24 12 42.8	6.5	6.2	0.46	24	2 52.8	21 7 52.57	18 31 50.6	8.1	7.8	0.55
9	1 54.6	17 12 8.59	24 21 28.1	6.5	6.3	0.46	25	2 53.7	21 12 40.23	18 9 33.3	8.1	7.8	0.55
10	1 56.0	17 17 30.77	-24 29 30.5	6.5	6.3	0.46	26	2 54.5	21 17 26.29	-17 46 47.8	8.2	7.9	0.55
11	1 57.4	17 22 53.51	24 36 49.6	6.6	6.3	0.46	27	2 55.3	21 22 10.73	17 23 34.8	8.2	7.9	0.56
12	1 58.9	17 28 16.77	24 43 25.0	6.6	6.3	0.47	28	2 56.0	21 26 53.55	16 59 55.3	8.3	8.0	0.56
13	2 0.3	17 33 40.47	24 49 16.6	6.6	6.4	0.47	29	2 56.7	21 31 34.77	16 35 49.9	8.3	8.0	0.56
14	2 1.8	17 39 4.53	24 54 24.0	6.6	6.4	0.47	30	2 57.4	21 36 14.39	16 11 19.5	8.4	8.1	0.56
15	2 3.3	17 44 28.90	-24 58 47.0	6.7	6.4	0.47	31	2 58.1	21 40 52.42	-15 46 24.9	8.4	8.1	0.56
16	2 4.8	17 49 53.50	-25 2 25.3	6.7	6.4	0.48	32	2 58.8	21 45 28.85	-15 21 6.9	8.5	8.2	0.57

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	18 8.5	12 50 41.34	-3 8 24.6	6.4	3.6	0.24	Feb. 15	16 6.7	13 49 53.71	-8 33 55.4	9.4	5.4	0.36
1	18 6.2	12 52 22.51	3 18 23.8	6.4	3.7	0.24	16	16 3.4	13 50 34.98	8 37 13.8	9.5	5.4	0.37
2	18 4.0	12 54 2.97	3 28 17.0	6.4	3.7	0.25	17	16 0.1	13 51 14.10	8 40 20.6	9.6	5.5	0.37
3	18 1.7	12 55 42.68	3 38 4.1	6.5	3.7	0.25	18	15 56.8	13 51 51.04	8 43 15.5	9.7	5.5	0.38
4	17 59.4	12 57 21.64	3 47 45.0	6.5	3.7	0.25	19	15 53.4	13 52 25.76	8 45 58.6	9.8	5.6	0.38
5	17 57.1	12 58 59.81	-3 57 19.3	6.6	3.8	0.25	20	15 50.0	13 52 58.23	-8 48 29.5	9.9	5.6	0.38
6	17 54.8	13 0 37.18	4 6 47.2	6.6	3.8	0.25	21	15 46.6	13 53 28.40	8 50 48.4	10.0	5.7	0.39
7	17 52.5	13 2 13.74	4 16 8.4	6.7	3.8	0.26	22	15 43.1	13 53 56.22	8 52 55.0	10.1	5.8	0.39
8	17 50.1	13 3 49.46	4 25 22.9	6.7	3.9	0.26	23	15 39.7	13 54 21.66	8 54 49.4	10.2	5.8	0.39
9	17 47.8	13 5 24.31	4 34 30.5	6.8	3.9	0.26	24	15 36.1	13 54 44.69	8 56 31.3	10.3	5.9	0.40
10	17 45.4	13 6 58.27	-4 43 31.1	6.8	3.9	0.26	25	15 32.5	13 55 5.25	-8 58 0.7	10.4	5.9	0.40
11	17 43.0	13 8 31.32	4 52 24.4	6.9	3.9	0.26	26	15 28.9	13 55 23.23	8 59 17.3	10.5	6.0	0.40
12	17 40.6	13 10 3.44	5 1 10.5	6.9	4.0	0.27	27	15 25.2	13 55 38.76	9 0 21.0	10.6	6.1	0.41
13	17 38.2	13 11 34.60	5 9 49.2	7.0	4.0	0.27	28	15 21.5	13 55 51.63	9 1 11.8	10.7	6.1	0.41
14	17 35.8	13 13 4.79	5 18 20.4	7.1	4.0	0.27	29	15 17.8	13 56 1.86	9 1 49.5	10.8	6.2	0.41
15	17 33.3	13 14 33.98	-5 26 44.0	7.1	4.1	0.27	Mar. 1	15 14.0	13 56 9.39	-9 2 13.9	10.9	6.2	0.42
16	17 30.9	13 16 2.15	5 34 59.8	7.2	4.1	0.27	2	15 10.1	13 56 14.18	9 2 25.0	11.0	6.3	0.42
17	17 28.4	13 17 29.28	5 43 7.9	7.2	4.2	0.28	3	15 6.2	13 56 16.20	9 2 22.6	11.1	6.3	0.43
18	17 25.9	13 18 55.35	5 51 8.1	7.3	4.2	0.28	4	15 2.3	13 56 15.41	9 2 6.6	11.2	6.4	0.43
19	17 23.4	13 20 20.32	5 59 0.2	7.4	4.2	0.28	5	14 58.3	13 56 11.76	9 1 36.8	11.3	6.5	0.44
20	17 20.8	13 21 44.19	-6 6 44.2	7.4	4.3	0.28	6	14 54.2	13 56 5.22	-9 0 53.2	11.4	6.5	0.44
21	17 18.3	13 23 6.92	6 14 19.9	7.5	4.3	0.29	7	14 50.1	13 55 55.78	8 59 55.8	11.5	6.6	0.44
22	17 15.7	13 24 28.50	6 21 47.3	7.5	4.3	0.29	8	14 46.0	13 55 43.40	8 58 44.5	11.7	6.6	0.45
23	17 13.1	13 25 48.89	6 29 6.3	7.6	4.4	0.29	9	14 41.9	13 55 28.05	8 57 19.1	11.8	6.7	0.45
24	17 10.5	13 27 8.07	6 36 16.7	7.7	4.4	0.29	10	14 37.6	13 55 9.72	8 55 39.7	11.9	6.8	0.46
25	17 7.8	13 28 26.02	-6 43 18.6	7.8	4.4	0.30	11	14 33.3	13 54 48.40	-8 53 46.3	12.0	6.8	0.46
26	17 5.2	13 29 42.70	6 50 11.8	7.8	4.5	0.30	12	14 28.9	13 54 24.09	8 51 38.9	12.1	6.9	0.47
27	17 2.5	13 30 58.09	6 56 56.1	7.9	4.5	0.30	13	14 24.5	13 53 56.79	8 49 17.6	12.2	7.0	0.47
28	16 59.8	13 32 12.15	7 3 31.4	8.0	4.5	0.31	14	14 20.1	13 53 26.51	8 46 42.4	12.3	7.1	0.47
29	16 57.1	13 33 24.84	7 9 57.7	8.1	4.6	0.31	15	14 15.6	13 52 53.25	8 43 53.5	12.4	7.2	0.48
30	16 54.3	13 34 36.14	-7 16 14.7	8.1	4.6	0.31	16	14 11.1	13 52 17.04	-8 40 51.0	12.5	7.2	0.48
31	16 51.5	13 35 46.00	7 22 22.4	8.2	4.7	0.31	17	14 6.5	13 51 37.90	8 37 35.1	12.6	7.3	0.49
Feb. 1	16 48.7	13 36 54.39	7 28 20.6	8.2	4.7	0.32	18	14 1.9	13 50 55.86	8 34 6.0	12.7	7.4	0.49
2	16 45.9	13 38 1.26	7 34 9.1	8.3	4.7	0.32	19	13 57.2	13 50 10.95	8 30 23.8	12.8	7.4	0.49
3	16 43.1	13 39 6.57	7 39 47.8	8.4	4.8	0.32	20	13 52.5	13 49 23.22	8 26 28.7	12.9	7.5	0.50
4	16 40.2	13 40 10.30	-7 45 16.6	8.5	4.8	0.32	21	13 47.7	13 48 32.69	-8 22 21.1	13.0	7.5	0.50
5	16 37.3	13 41 12.38	7 50 35.3	8.6	4.9	0.33	22	13 42.9	13 47 39.44	8 18 1.3	13.1	7.6	0.51
6	16 34.4	13 42 12.79	7 55 43.8	8.6	4.9	0.33	23	13 38.1	13 46 43.48	8 13 29.5	13.2	7.6	0.51
7	16 31.5	13 43 11.47	8 0 41.9	8.7	4.9	0.33	24	13 33.1	13 45 44.90	8 8 46.0	13.2	7.7	0.51
8	16 28.5	13 44 8.38	8 5 29.4	8.8	5.0	0.34	25	13 28.2	13 44 43.77	8 3 51.3	13.3	7.7	0.52
9	16 25.5	13 45 3.48	-8 10 6.2	8.9	5.0	0.34	26	13 23.2	13 43 40.17	-7 58 45.7	13.4	7.8	0.52
10	16 22.4	13 45 56.72	8 14 32.2	9.0	5.1	0.34	27	13 18.2	13 42 34.17	7 53 29.6	13.5	7.8	0.52
11	16 19.3	13 46 48.07	8 18 47.3	9.1	5.2	0.35	28	13 13.1	13 41 25.83	7 48 3.4	13.6	7.9	0.53
12	16 16.2	13 47 37.49	8 22 51.3	9.1	5.2	0.35	29	13 8.0	13 40 15.25	7 42 27.6	13.7	7.9	0.53
13	16 13.1	13 48 24.93	8 26 44.1	9.2	5.3	0.36	30	13 2.9	13 39 2.54	7 36 42.8	13.8	8.0	0.53
14	16 9.9	13 49 10.35	-8 30 25.5	9.3	5.3	0.36	31	12 57.7	13 37 47.79	-7 30 49.5	13.9	8.0	0.54
15	16 6.7	13 49 53.71	-8 33 55.4	9.4	5.4	0.36	32	12 52.5	13 36 31.13	-7 24 48.2	14.0	8.0	0.54

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	12 52.5	13 36 31.13	-7 24 48.2	14.0	8.0	0.54	May 17	9 0.5	12 45 23.07	-4 8 4.1	12.9	7.4	0.49
2	12 47.2	13 35 12.68	7 19 39.7	14.1	8.0	0.54	18	8 56.4	12 45 8.73	4 9 12.2	12.8	7.3	0.49
3	12 42.0	13 33 52.55	7 12 24.5	14.1	8.1	0.54	19	8 52.3	12 44 57.37	4 10 37.5	12.8	7.3	0.49
4	12 36.7	13 32 30.88	7 6 3.3	14.2	8.1	0.54	20	8 48.2	12 44 48.96	4 12 19.9	12.7	7.2	0.48
5	12 31.4	13 31 7.80	6 59 36.8	14.2	8.1	0.55	21	8 44.2	12 44 43.49	4 14 19.1	12.6	7.2	0.48
6	12 26.1	13 29 43.49	-6 53 6.0	14.3	8.2	0.55	22	8 40.2	12 44 40.93	-4 16 34.9	12.5	7.1	0.47
7	12 20.7	13 28 18.10	6 46 31.7	14.3	8.2	0.55	23	8 36.3	12 44 41.24	4 19 7.2	12.4	7.1	0.47
8	12 15.3	13 26 51.80	6 39 54.7	14.4	8.2	0.55	24	8 32.4	12 44 44.38	4 21 55.7	12.3	7.0	0.47
9	12 10.0	13 25 24.74	6 33 15.9	14.4	8.3	0.55	25	8 28.6	12 44 50.33	4 25 0.2	12.2	7.0	0.46
10	12 4.6	13 23 57.10	6 26 36.2	14.5	8.3	0.56	26	8 24.8	12 44 59.05	4 28 20.3	12.1	6.9	0.46
11	11 59.2	13 22 29.05	-6 19 56.5	14.5	8.3	0.56	27	8 21.0	12 45 10.51	-4 31 55.9	12.0	6.9	0.46
12	11 53.8	13 21 0.78	6 13 17.8	14.5	8.3	0.56	28	8 17.3	12 45 24.67	4 35 46.6	11.9	6.8	0.46
13	11 48.4	13 19 32.47	6 6 41.0	14.5	8.3	0.56	29	8 13.7	12 45 41.51	4 39 52.3	11.9	6.8	0.45
14	11 42.9	13 18 4.28	6 0 7.1	14.5	8.3	0.56	30	8 10.1	12 46 0.97	4 44 12.7	11.8	6.7	0.45
15	11 37.5	13 16 36.40	5 53 37.1	14.6	8.3	0.56	31	8 6.5	12 46 23.03	4 48 47.6	11.7	6.7	0.45
16	11 32.1	13 15 9.00	-5 47 11.9	14.6	8.3	0.56	June 1	8 3.0	12 46 47.67	-4 53 36.7	11.6	6.6	0.45
17	11 26.8	13 13 42.24	5 40 52.3	14.6	8.3	0.56	2	7 59.5	12 47 14.84	4 58 39.7	11.5	6.6	0.44
18	11 21.4	13 12 16.28	5 34 39.3	14.6	8.3	0.56	3	7 56.1	12 47 44.52	5 3 56.5	11.4	6.5	0.44
19	11 16.1	13 10 51.28	5 28 33.7	14.6	8.3	0.56	4	7 52.8	12 48 16.68	5 9 26.9	11.3	6.5	0.44
20	11 10.8	13 9 27.41	5 22 36.5	14.6	8.3	0.56	5	7 49.4	12 48 51.29	5 15 10.7	11.2	6.4	0.43
21	11 5.5	13 8 4.83	-5 16 48.3	14.6	8.3	0.56	6	7 46.1	12 49 28.31	-5 21 7.6	11.2	6.4	0.43
22	11 0.2	13 6 43.64	5 11 9.9	14.5	8.3	0.55	7	7 42.8	12 50 7.71	5 27 17.3	11.1	6.3	0.43
23	10 54.9	13 5 23.98	5 4 41.9	14.5	8.3	0.55	8	7 39.5	12 50 49.45	5 33 39.5	11.0	6.3	0.42
24	10 49.7	13 4 5.99	5 0 25.1	14.4	8.3	0.55	9	7 36.3	12 51 33.49	5 40 14.0	10.9	6.2	0.42
25	10 44.5	13 2 49.80	4 55 20.2	14.4	8.2	0.55	10	7 33.1	12 52 19.80	5 47 0.7	10.8	6.2	0.42
26	10 39.3	13 1 35.52	-4 50 27.7	14.4	8.2	0.55	11	7 30.0	12 53 8.35	-5 53 59.2	10.8	6.1	0.41
27	10 34.2	13 0 23.27	4 45 48.3	14.3	8.2	0.55	12	7 26.9	12 53 59.09	6 1 9.4	10.7	6.1	0.41
28	10 29.1	12 59 13.13	4 41 22.5	14.3	8.2	0.55	13	7 23.9	12 54 51.99	6 8 30.8	10.6	6.0	0.41
29	10 24.0	12 58 5.21	4 37 10.6	14.3	8.1	0.54	14	7 20.9	12 55 47.00	6 16 3.2	10.5	6.0	0.40
30	10 19.0	12 56 59.61	4 33 13.2	14.2	8.1	0.54	15	7 17.9	12 56 44.09	6 23 46.3	10.4	6.0	0.40
May 1	10 14.0	12 55 56.40	-4 29 30.8	14.2	8.1	0.54	16	7 15.0	12 57 43.21	-6 31 39.9	10.4	5.9	0.40
2	10 9.1	12 54 55.69	4 26 3.7	14.1	8.0	0.54	17	7 12.0	12 58 44.33	6 39 43.7	10.3	5.9	0.39
3	10 4.2	12 53 57.55	4 22 52.4	14.0	8.0	0.54	18	7 9.1	12 59 47.40	6 47 57.4	10.2	5.8	0.39
4	9 59.3	12 53 2.05	4 19 57.2	14.0	8.0	0.53	19	7 6.3	13 0 52.40	6 56 20.8	10.1	5.8	0.39
5	9 54.5	12 52 9.26	4 17 18.4	13.9	7.9	0.53	20	7 3.4	13 1 59.27	7 4 53.4	10.1	5.7	0.39
6	9 49.8	12 51 19.23	-4 14 56.4	13.8	7.9	0.53	21	7 0.6	13 3 7.98	-7 13 35.1	10.0	5.7	0.38
7	9 45.0	12 50 32.03	4 12 51.3	13.7	7.8	0.52	22	6 57.9	13 4 18.52	7 22 25.6	9.9	5.7	0.38
8	9 40.4	12 49 47.71	4 11 3.4	13.7	7.8	0.52	23	6 55.2	13 5 30.82	7 31 24.6	9.8	5.6	0.38
9	9 35.8	12 49 6.32	4 9 32.9	13.6	7.8	0.52	24	6 52.5	13 6 44.88	7 40 31.8	9.8	5.6	0.38
10	9 31.2	12 48 27.88	4 8 19.9	13.5	7.7	0.52	25	6 49.8	13 8 0.66	7 49 47.0	9.7	5.5	0.37
11	9 26.6	12 47 52.43	-4 7 24.6	13.5	7.7	0.51	26	6 47.2	13 9 18.13	-7 59 10.0	9.6	5.5	0.37
12	9 22.2	12 47 19.98	4 6 46.9	13.4	7.6	0.51	27	6 44.6	13 10 37.27	8 8 40.5	9.6	5.5	0.37
13	9 17.8	12 46 50.54	4 6 27.0	13.3	7.6	0.51	28	6 42.0	13 11 58.05	8 18 18.3	9.5	5.4	0.36
14	9 13.4	12 46 24.13	4 6 24.8	13.2	7.5	0.50	29	6 39.4	13 13 20.45	8 28 3.1	9.4	5.4	0.36
15	9 9.0	12 46 0.76	4 6 40.3	13.1	7.5	0.50	30	6 36.9	13 14 44.45	8 37 54.9	9.4	5.4	0.36
16	9 4.7	12 45 40.41	-4 7 13.4	13.0	7.4	0.50	July 1	6 34.4	13 16 10.03	-8 47 53.3	9.3	5.3	0.36
17	9 0.5	12 45 23.07	-4 8 4.1	12.9	7.4	0.49	2	6 31.9	13 17 37.17	-8 57 58.1	9.2	5.3	0.35

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semidiam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semidiam.	S.T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Mar. 1	17 33.5	16 16 6.10	-20 20 41.4	1.7	18.1	1.37	Apr. 15	14 35.1	16 14 40.77	-20 13 32.9	1.9	20.6	1.56
2	17 29.8	16 16 21.06	20 21 12.9	1.7	18.2	1.38	16	14 30.9	16 14 21.76	20 12 42.6	1.9	20.7	1.57
3	17 26.1	16 16 35.29	20 21 42.4	1.7	18.2	1.38	17	14 26.7	16 14 2.10	20 11 50.7	2.0	20.7	1.57
4	17 22.4	16 16 48.78	20 22 10.1	1.7	18.3	1.39	18	14 22.4	16 13 41.81	20 10 57.2	2.0	20.8	1.57
5	17 18.7	16 17 1.52	20 22 35.8	1.7	18.3	1.39	19	14 18.1	16 13 20.90	20 10 2.2	2.0	20.8	1.57
6	17 14.9	16 17 13.52	-20 22 59.6	1.7	18.4	1.39	20	14 13.8	16 12 59.40	-20 9 5.6	2.0	20.9	1.58
7	17 11.2	16 17 24.77	20 23 21.5	1.7	18.5	1.40	21	14 9.5	16 12 37.31	20 8 7.5	2.0	20.9	1.58
8	17 7.5	16 17 35.26	20 23 41.5	1.7	18.5	1.40	22	14 5.2	16 12 14.64	20 7 8.0	2.0	21.0	1.58
9	17 3.7	16 17 44.97	20 23 59.6	1.7	18.6	1.41	23	14 0.9	16 11 51.40	20 6 7.0	2.0	21.0	1.59
10	16 59.9	16 17 53.92	20 24 15.8	1.8	18.7	1.41	24	13 56.5	16 11 27.61	20 5 4.5	2.0	21.0	1.59
11	16 56.1	16 18 2.10	-20 24 30.1	1.8	18.7	1.42	25	13 52.2	16 11 3.30	-20 4 0.8	2.0	21.0	1.59
12	16 52.3	16 18 9.51	20 24 42.5	1.8	18.8	1.42	26	13 47.9	16 10 38.46	20 2 55.6	2.0	21.1	1.60
13	16 48.5	16 18 16.14	20 24 53.0	1.8	18.8	1.43	27	13 43.5	16 10 13.12	20 1 49.1	2.0	21.1	1.60
14	16 44.6	16 18 21.99	20 25 1.6	1.8	18.9	1.43	28	13 39.2	16 9 47.29	20 0 41.4	2.0	21.1	1.60
15	16 40.8	16 18 27.05	20 25 8.3	1.8	18.9	1.43	29	13 34.8	16 9 20.99	19 59 32.2	2.0	21.2	1.61
16	16 37.0	16 18 31.33	-20 25 13.2	1.8	19.0	1.44	30	13 30.4	16 8 54.23	-19 58 21.8	2.0	21.2	1.61
17	16 33.1	16 18 34.83	20 25 16.1	1.8	19.1	1.44	May 1	13 26.0	16 8 27.02	19 57 10.2	2.0	21.2	1.61
18	16 29.2	16 18 37.54	20 25 17.3	1.8	19.1	1.45	2	13 21.6	16 7 59.40	19 55 57.5	2.0	21.3	1.61
19	16 25.3	16 18 39.47	20 25 16.5	1.8	19.2	1.45	3	13 17.2	16 7 31.37	19 54 43.6	2.0	21.3	1.61
20	16 21.4	16 18 40.62	20 25 13.9	1.8	19.2	1.46	4	13 12.8	16 7 2.95	19 53 28.6	2.0	21.4	1.61
21	16 17.4	16 18 40.98	-20 25 9.4	1.8	19.3	1.46	5	13 8.4	16 6 34.17	-19 52 12.4	2.0	21.4	1.62
22	16 13.5	16 18 40.56	20 25 3.1	1.8	19.3	1.46	6	13 4.0	16 6 5.04	19 50 55.3	2.0	21.4	1.62
23	16 9.6	16 18 39.35	20 24 54.9	1.8	19.4	1.47	7	12 59.6	16 5 35.59	19 49 37.2	2.0	21.5	1.62
24	16 5.6	16 18 37.36	20 24 44.9	1.8	19.5	1.47	8	12 55.2	16 5 5.82	19 48 18.1	2.0	21.5	1.62
25	16 1.6	16 18 34.59	20 24 33.1	1.8	19.5	1.48	9	12 50.7	16 4 35.78	19 46 58.2	2.0	21.5	1.62
26	15 57.6	16 18 31.04	-20 24 19.5	1.8	19.6	1.48	10	12 46.3	16 4 5.47	-19 45 37.5	2.0	21.5	1.62
27	15 53.6	16 18 26.71	20 24 4.1	1.9	19.6	1.48	11	12 41.9	16 3 34.91	19 44 16.0	2.0	21.5	1.62
28	15 49.6	16 18 21.61	20 23 46.8	1.9	19.7	1.49	12	12 37.4	16 3 4.14	19 42 53.8	2.0	21.6	1.62
29	15 45.5	16 18 15.73	20 23 27.8	1.9	19.8	1.49	13	12 33.0	16 2 33.17	19 41 30.9	2.0	21.6	1.63
30	15 41.5	16 18 9.08	20 23 6.9	1.9	19.8	1.50	14	12 28.5	16 2 2.03	19 40 7.4	2.0	21.6	1.63
31	15 37.4	16 18 1.65	-20 22 44.2	1.9	19.9	1.50	15	12 24.1	16 1 30.74	-19 38 43.3	2.0	21.6	1.63
Apr. 1	15 33.4	16 17 53.46	20 22 19.8	1.9	19.9	1.51	16	12 19.6	16 0 59.32	19 37 18.8	2.0	21.6	1.63
2	15 29.3	16 17 44.49	20 21 53.5	1.9	20.0	1.51	17	12 15.2	16 0 27.80	19 35 53.8	2.0	21.6	1.63
3	15 25.2	16 17 34.76	20 21 25.5	1.9	20.1	1.52	18	12 10.7	15 59 56.19	19 34 28.4	2.0	21.6	1.63
4	15 21.1	16 17 24.28	20 20 55.7	1.9	20.1	1.52	19	12 6.3	15 59 24.52	19 33 2.8	2.0	21.6	1.63
5	15 17.0	16 17 13.05	-20 20 24.2	1.9	20.2	1.53	20	12 1.8	15 58 52.80	-19 31 36.9	2.0	21.6	1.63
6	15 12.9	16 17 1.06	20 19 50.8	1.9	20.2	1.53	21	11 57.3	15 58 21.07	19 30 10.8	2.0	21.6	1.63
7	15 8.7	16 16 48.33	20 19 15.7	1.9	20.2	1.53	22	11 52.9	15 57 49.34	19 28 44.7	2.0	21.6	1.63
8	15 4.6	16 16 34.86	20 18 38.8	1.9	20.3	1.54	23	11 48.4	15 57 17.63	19 27 18.4	2.0	21.6	1.63
9	15 0.4	16 16 20.68	20 18 0.2	1.9	20.3	1.54	24	11 43.9	15 56 45.97	19 25 52.1	2.0	21.6	1.63
10	14 56.2	16 16 5.77	-20 17 19.9	1.9	20.4	1.54	25	11 39.5	15 56 14.37	-19 24 25.9	2.0	21.6	1.63
11	14 52.0	16 15 50.14	20 16 37.8	1.9	20.4	1.55	26	11 35.0	15 55 42.86	19 22 59.9	2.0	21.6	1.63
12	14 47.8	16 15 33.82	20 15 54.1	1.9	20.5	1.55	27	11 30.6	15 55 11.45	19 21 34.0	2.0	21.6	1.63
13	14 43.5	16 15 16.81	20 15 8.7	1.9	20.5	1.56	28	11 26.1	15 54 40.17	19 20 8.3	2.0	21.6	1.63
14	14 39.3	16 14 59.12	20 14 21.6	1.9	20.6	1.56	29	11 21.7	15 54 9.04	19 18 43.0	2.0	21.6	1.63
15	14 35.1	16 14 40.77	-20 13 32.9	1.9	20.6	1.56	30	11 17.2	15 53 38.07	-19 17 18.1	2.0	21.6	1.62
16	14 30.9	16 14 21.76	-20 12 42.6	1.9	20.7	1.57	31	11 12.8	15 53 7.20	-19 15 53.5	2.0	21.6	1.62



## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
June 1	11 8.3	15 52 36.73	-19 14 29.5	2.0	21.6	1.62	July 17	7 52.7	15 37 44.81	-18 36 25.0	1.9	19.8	1.48
2	11 3.9	15 52 6.40	19 13 6.0	2.0	21.6	1.62	18	7 48.7	15 37 40.78	18 36 26.0	1.8	19.8	1.48
3	10 59.5	15 51 36.32	19 11 43.2	2.0	21.6	1.62	19	7 44.7	15 37 37.51	18 36 29.5	1.8	19.7	1.48
4	10 55.0	15 51 6.50	19 10 21.1	2.0	21.5	1.62	20	7 40.7	15 37 34.98	18 36 35.6	1.8	19.6	1.47
5	10 50.6	15 50 36.98	19 8 59.7	2.0	21.5	1.62	21	7 36.7	15 37 33.19	18 36 44.2	1.8	19.6	1.47
6	10 46.2	15 50 7.76	-19 7 39.3	2.0	21.5	1.61	22	7 32.8	15 37 32.15	-18 36 55.3	1.8	19.5	1.46
7	10 41.8	15 49 38.88	19 6 19.8	2.0	21.5	1.61	23	7 28.8	15 37 31.85	18 37 9.0	1.8	19.5	1.46
8	10 37.4	15 49 10.35	19 5 1.2	2.0	21.5	1.61	24	7 24.9	15 37 32.30	18 37 25.2	1.8	19.4	1.46
9	10 33.0	15 48 42.21	19 3 43.8	2.0	21.4	1.61	25	7 21.0	15 37 33.49	18 37 43.8	1.8	19.4	1.45
10	10 28.6	15 48 14.44	19 2 27.4	2.0	21.4	1.61	26	7 17.1	15 37 35.43	18 38 4.9	1.8	19.3	1.45
11	10 24.2	15 47 47.08	-19 1 12.2	2.0	21.4	1.60	27	7 13.2	15 37 38.11	-18 38 28.6	1.8	19.3	1.44
12	10 19.8	15 47 20.15	18 59 58.3	2.0	21.4	1.60	28	7 9.4	15 37 41.52	18 38 54.7	1.8	19.2	1.44
13	10 15.4	15 46 53.67	18 58 45.6	2.0	21.3	1.60	29	7 5.5	15 37 45.68	18 39 23.3	1.8	19.2	1.43
14	10 11.1	15 46 27.65	18 57 34.3	2.0	21.3	1.60	30	7 1.6	15 37 50.58	18 39 54.3	1.8	19.1	1.43
15	10 6.7	15 46 2.10	18 56 24.5	2.0	21.3	1.60	31	6 57.8	15 37 56.20	18 40 27.7	1.8	19.0	1.43
16	10 2.4	15 45 37.04	-18 55 16.1	2.0	21.2	1.59	Aug. 1	6 54.0	15 38 2.57	-18 41 3.7	1.8	19.0	1.42
17	9 58.0	15 45 12.50	18 54 9.3	2.0	21.2	1.59	2	6 50.2	15 38 9.66	18 41 42.0	1.8	18.9	1.42
18	9 53.7	15 44 48.47	18 53 4.1	2.0	21.2	1.59	3	6 46.4	15 38 17.50	18 42 22.6	1.8	18.9	1.41
19	9 49.4	15 44 24.97	18 52 0.6	2.0	21.2	1.59	4	6 42.6	15 38 26.06	18 43 5.7	1.8	18.8	1.41
20	9 45.1	15 44 2.02	18 50 58.8	2.0	21.1	1.58	5	6 38.8	15 38 35.37	18 43 51.3	1.8	18.8	1.41
21	9 40.8	15 43 39.62	-18 49 58.8	2.0	21.1	1.58	6	6 35.0	15 38 45.40	-18 44 39.2	1.8	18.7	1.40
22	9 36.5	15 43 17.80	18 49 0.6	2.0	21.1	1.58	7	6 31.3	15 38 56.15	18 45 29.4	1.8	18.7	1.40
23	9 32.2	15 42 56.56	18 48 4.3	2.0	21.0	1.57	8	6 27.5	15 39 7.62	18 46 21.9	1.8	18.6	1.39
24	9 27.9	15 42 35.92	18 47 9.8	2.0	21.0	1.57	9	6 23.8	15 39 19.80	18 47 16.8	1.7	18.6	1.39
25	9 23.7	15 42 15.87	18 46 17.4	2.0	20.9	1.57	10	6 20.1	15 39 32.70	18 48 13.8	1.7	18.5	1.39
26	9 19.4	15 41 56.43	-18 45 26.9	2.0	20.9	1.56	11	6 16.4	15 39 46.31	-18 49 13.1	1.7	18.5	1.38
27	9 15.2	15 41 37.61	18 44 38.4	2.0	20.8	1.56	12	6 12.7	15 40 0.62	18 50 14.6	1.7	18.4	1.38
28	9 10.9	15 41 19.42	18 43 51.9	2.0	20.8	1.56	13	6 9.0	15 40 15.64	18 51 18.4	1.7	18.3	1.38
29	9 6.7	15 41 1.88	18 43 7.6	1.9	20.7	1.55	14	6 5.3	15 40 31.35	18 52 24.2	1.7	18.3	1.37
30	9 2.5	15 40 44.99	18 42 25.3	1.9	20.7	1.55	15	6 1.7	15 40 47.75	18 53 32.2	1.7	18.2	1.37
July 1	8 58.3	15 40 23.75	-18 41 45.3	1.9	20.6	1.55	16	5 58.0	15 41 4.83	-18 54 42.4	1.7	18.2	1.36
2	8 54.1	15 40 13.19	18 41 7.4	1.9	20.6	1.54	17	5 54.4	15 41 22.58	18 55 54.6	1.7	18.1	1.36
3	8 49.9	15 39 58.30	18 40 31.8	1.9	20.5	1.54	18	5 50.8	15 41 41.01	18 57 8.7	1.7	18.1	1.36
4	8 45.8	15 39 44.11	18 39 58.6	1.9	20.5	1.54	19	5 47.2	15 42 0.11	18 58 24.9	1.7	18.0	1.35
5	8 41.6	15 39 30.60	18 39 27.6	1.9	20.4	1.53	20	5 43.6	15 42 19.87	18 59 43.0	1.7	18.0	1.35
6	8 37.4	15 39 17.80	-18 38 58.9	1.9	20.4	1.53	21	5 40.0	15 42 40.28	-19 1 3.0	1.7	17.9	1.35
7	8 33.3	15 39 5.71	18 38 32.6	1.9	20.3	1.52	22	5 36.4	15 43 1.34	19 2 24.9	1.7	17.9	1.34
8	8 29.2	15 38 54.33	18 38 8.7	1.9	20.3	1.52	23	5 32.8	15 43 23.05	19 3 48.6	1.7	17.8	1.34
9	8 25.1	15 38 43.66	18 37 47.2	1.9	20.2	1.52	24	5 29.2	15 43 45.41	19 5 14.2	1.7	17.8	1.34
10	8 21.0	15 38 33.72	18 37 28.2	1.9	20.2	1.51	25	5 25.7	15 44 8.40	19 6 41.6	1.7	17.7	1.33
11	8 16.9	15 38 24.52	-18 37 11.6	1.9	20.1	1.51	26	5 22.2	15 44 32.03	-19 8 10.7	1.7	17.7	1.33
12	8 12.8	15 38 16.06	18 36 57.6	1.9	20.1	1.50	27	5 18.6	15 44 56.28	19 9 41.5	1.7	17.6	1.32
13	8 8.8	15 38 8.33	18 36 46.1	1.9	20.0	1.50	28	5 15.1	15 45 22.15	19 11 14.0	1.6	17.6	1.32
14	8 4.7	15 38 1.34	18 36 37.0	1.9	20.0	1.50	29	5 11.6	15 45 46.65	19 12 48.2	1.6	17.5	1.31
15	8 0.7	15 37 55.09	18 36 30.5	1.9	19.9	1.49	30	5 8.1	15 46 12.75	19 14 24.0	1.6	17.5	1.31
16	7 56.7	15 37 49.58	-18 36 26.5	1.9	19.9	1.49	31	5 4.6	15 46 39.46	-19 16 1.3	1.6	17.4	1.31
17	7 52.7	15 37 44.81	-18 36 25.0	1.9	19.8	1.48	32	5 1.1	15 47 6.78	-19 17 40.2	1.6	17.4	1.30

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	13 47.7	8 29 11.33	+19 30 46.7	1.1	9.5	0.72	Feb. 15	10 32.1	8 14 25.95	+20 25 4.2	1.1	9.5	0.73
1	13 43.5	8 28 53.95	19 31 55.6	1.1	9.6	0.72	16	10 27.9	8 14 8.83	20 26 3.1	1.1	9.5	0.72
2	13 39.2	8 28 36.32	19 33 5.2	1.1	9.6	0.72	17	10 23.7	8 13 51.98	20 27 1.1	1.1	9.5	0.72
3	13 35.0	8 28 18.46	19 34 15.5	1.1	9.6	0.72	18	10 19.5	8 13 35.41	20 27 57.9	1.1	9.5	0.72
4	13 30.8	8 28 0.38	19 35 26.4	1.1	9.6	0.72	19	10 15.3	8 13 19.12	20 28 53.7	1.1	9.5	0.72
5	13 26.6	8 27 42.08	+19 36 37.8	1.1	9.6	0.73	20	10 11.1	8 13 3.11	+20 29 48.4	1.1	9.5	0.72
6	13 22.3	8 27 23.57	19 37 49.8	1.1	9.6	0.73	21	10 6.9	8 12 47.40	20 30 42.1	1.1	9.5	0.72
7	13 18.1	8 27 4.87	19 39 2.3	1.1	9.6	0.73	22	10 2.7	8 12 32.01	20 31 34.6	1.1	9.5	0.72
8	13 13.8	8 26 45.99	19 40 15.2	1.1	9.6	0.73	23	9 58.5	8 12 16.93	20 32 25.9	1.1	9.5	0.72
9	13 9.6	8 26 26.94	19 41 28.5	1.1	9.6	0.73	24	9 54.3	8 12 2.17	20 33 16.1	1.1	9.5	0.72
10	13 5.3	8 26 7.72	+19 42 42.2	1.1	9.6	0.73	25	9 50.2	8 11 47.75	+20 34 5.1	1.1	9.4	0.72
11	13 1.1	8 25 48.35	19 43 56.2	1.1	9.6	0.73	26	9 46.0	8 11 33.66	20 34 52.9	1.1	9.4	0.72
12	12 56.8	8 25 28.85	19 45 10.4	1.1	9.6	0.73	27	9 41.8	8 11 19.92	20 35 39.4	1.1	9.4	0.72
13	12 52.6	8 25 9.21	19 46 24.9	1.1	9.6	0.73	28	9 37.7	8 11 6.52	20 36 24.7	1.1	9.4	0.72
14	12 48.3	8 24 49.46	19 47 39.6	1.1	9.6	0.73	29	9 33.5	8 10 53.47	20 37 8.8	1.1	9.4	0.72
15	12 44.0	8 24 29.60	+19 48 54.4	1.1	9.6	0.73	Mar. 1	9 29.4	8 10 40.79	+20 37 51.6	1.1	9.4	0.71
16	12 39.8	8 24 9.65	19 50 9.2	1.1	9.6	0.73	2	9 25.3	8 10 28.48	20 38 33.2	1.1	9.4	0.71
17	12 35.5	8 23 49.62	19 51 24.2	1.1	9.6	0.73	3	9 21.1	8 10 16.55	20 39 13.4	1.1	9.4	0.71
18	12 31.2	8 23 29.53	19 52 39.1	1.1	9.6	0.73	4	9 17.0	8 10 4.99	20 39 52.4	1.1	9.3	0.71
19	12 27.0	8 23 9.38	19 53 54.0	1.1	9.6	0.73	5	9 12.9	8 9 53.83	20 40 30.1	1.1	9.3	0.71
20	12 22.7	8 22 49.19	+19 55 8.9	1.1	9.6	0.73	6	9 8.8	8 9 43.06	+20 41 6.5	1.1	9.3	0.71
21	12 18.4	8 22 28.97	19 56 23.6	1.1	9.6	0.73	7	9 4.7	8 9 32.69	20 41 41.5	1.1	9.3	0.71
22	12 14.2	8 22 8.72	19 57 38.2	1.1	9.6	0.73	8	9 0.6	8 9 22.72	20 42 15.2	1.1	9.3	0.71
23	12 9.9	8 21 48.47	19 58 52.5	1.1	9.6	0.73	9	8 56.5	8 9 13.16	20 42 47.5	1.1	9.3	0.71
24	12 5.6	8 21 28.21	20 0 6.7	1.1	9.6	0.73	10	8 52.4	8 9 4.01	20 43 18.5	1.0	9.3	0.71
25	12 1.4	8 21 7.98	+20 1 20.6	1.1	9.6	0.73	11	8 48.3	8 8 55.29	+20 43 48.1	1.0	9.2	0.70
26	11 57.1	8 20 47.75	20 2 34.1	1.1	9.6	0.73	12	8 44.3	8 8 46.98	20 44 16.3	1.0	9.2	0.70
27	11 52.8	8 20 27.57	20 3 47.3	1.1	9.6	0.73	13	8 40.2	8 8 39.12	20 44 43.2	1.0	9.2	0.70
28	11 48.6	8 20 7.45	20 5 0.2	1.1	9.6	0.73	14	8 36.1	8 8 31.68	20 45 8.6	1.0	9.2	0.70
29	11 44.3	8 19 47.38	20 6 12.5	1.1	9.6	0.73	15	8 32.1	8 8 24.68	20 45 32.7	1.0	9.2	0.70
30	11 40.0	8 19 27.38	+20 7 24.4	1.1	9.6	0.73	16	8 28.0	8 8 18.12	+20 45 55.4	1.0	9.2	0.70
31	11 35.8	8 19 7.47	20 8 35.8	1.1	9.6	0.73	17	8 24.0	8 8 12.00	20 46 16.6	1.0	9.2	0.70
Feb. 1	11 31.5	8 18 47.65	20 9 46.7	1.1	9.6	0.73	18	8 20.0	8 8 6.33	20 46 36.5	1.0	9.1	0.70
2	11 27.3	8 18 27.92	20 10 57.0	1.1	9.6	0.73	19	8 16.0	8 8 1.10	20 46 54.9	1.0	9.1	0.70
3	11 23.0	8 18 8.31	20 12 6.7	1.1	9.6	0.73	20	8 12.0	8 7 56.32	20 47 11.9	1.0	9.1	0.69
4	11 18.7	8 17 48.83	+20 13 15.8	1.1	9.6	0.73	21	8 7.9	8 7 51.98	+20 47 27.6	1.0	9.1	0.69
5	11 14.5	8 17 29.48	20 14 24.2	1.1	9.6	0.73	22	8 3.9	8 7 48.10	20 47 41.8	1.0	9.1	0.69
6	11 10.2	8 17 10.27	20 15 31.9	1.1	9.6	0.73	23	8 0.0	8 7 44.67	20 47 54.6	1.0	9.1	0.69
7	11 6.0	8 16 51.23	20 16 38.8	1.1	9.6	0.73	24	7 56.0	8 7 41.69	20 48 6.0	1.0	9.0	0.69
8	11 1.7	8 16 32.36	20 17 45.0	1.1	9.6	0.73	25	7 52.0	8 7 39.17	20 48 16.0	1.0	9.0	0.69
9	10 57.5	8 16 13.67	+20 18 50.4	1.1	9.6	0.73	26	7 48.0	8 7 37.10	+20 48 24.6	1.0	9.0	0.69
10	10 53.3	8 15 55.18	20 19 55.0	1.1	9.6	0.73	27	7 44.1	8 7 35.49	20 48 31.8	1.0	9.0	0.69
11	10 49.0	8 15 36.89	20 20 58.7	1.1	9.6	0.73	28	7 40.1	8 7 34.33	20 48 37.5	1.0	9.0	0.68
12	10 44.8	8 15 18.81	20 22 1.4	1.1	9.6	0.73	29	7 36.2	8 7 33.63	20 48 41.8	1.0	9.0	0.68
13	10 40.6	8 15 0.95	20 23 3.3	1.1	9.6	0.73	30	7 32.3	8 7 33.38	20 48 44.8	1.0	9.0	0.68
14	10 36.3	8 14 43.33	+20 24 4.2	1.1	9.5	0.73	31	7 28.3	8 7 33.59	+20 48 46.3	1.0	9.0	0.68
15	10 32.1	8 14 25.95	+20 25 4.2	1.1	9.5	0.73	Apr. 1	7 24.4	8 7 34.25	+20 48 46.4	1.0	8.9	0.68

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi- diam.	S.T. of Sem. Pass. Mer.
Apr. 1	h m	h m s	° ' "	"	"	s	Nov. 16	h m	h m s	° ' "	"	"	s
2	7 24.4	8 7 34.25	+20 48 46.4	1.0	8.9	0.68	17	17 43.9	9 31 34.87	+15 38 11.2	1.0	8.7	0.64
3	7 20.5	8 7 35.37	20 48 45.1	1.0	8.9	0.68	18	17 40.0	9 31 40.79	15 37 54.7	1.0	8.7	0.64
4	7 16.6	8 7 36.94	20 48 42.4	1.0	8.9	0.68	19	17 36.2	9 31 46.29	15 37 40.2	1.0	8.7	0.64
5	7 12.7	8 7 38.97	20 48 38.3	1.0	8.9	0.68	20	17 32.4	9 31 51.36	15 37 27.9	1.0	8.7	0.65
6	7 8.8	8 7 41.46	20 48 32.8	1.0	8.9	0.68	21	17 28.5	9 31 55.99	15 37 17.7	1.0	8.7	0.65
7	7 4.9	8 7 44.41	+20 48 25.9	1.0	8.9	0.67	22	17 24.6	9 32 0.19	+15 37 9.6	1.0	8.7	0.65
8	7 1.0	8 7 47.80	20 48 17.6	1.0	8.8	0.67	23	17 20.8	9 32 3.95	15 37 3.7	1.0	8.8	0.65
9	6 57.2	8 7 51.65	20 48 7.9	1.0	8.8	0.67	24	17 16.9	9 32 7.28	15 36 59.8	1.0	8.8	0.65
10	6 53.3	8 7 55.96	20 47 56.8	1.0	8.8	0.67	25	17 13.0	9 32 10.17	15 36 58.2	1.0	8.8	0.65
11	6 49.4	8 8 0.71	20 47 44.3	1.0	8.8	0.67	26	17 9.1	9 32 12.62	15 36 58.7	1.0	8.8	0.65
12	6 45.6	8 8 5.92	+20 47 30.4	1.0	8.8	0.67	27	17 5.2	9 32 14.63	+15 37 1.3	1.0	8.8	0.65
13	6 41.8	8 8 11.58	20 47 15.1	1.0	8.7	0.67	28	17 1.3	9 32 16.20	15 37 6.0	1.0	8.8	0.65
14	6 37.9	8 8 17.68	20 46 58.4	1.0	8.7	0.67	29	16 57.4	9 32 17.33	15 37 12.9	1.0	8.9	0.66
15	6 34.1	8 8 24.23	20 46 40.4	1.0	8.7	0.66	30	16 53.5	9 32 18.01	15 37 22.0	1.0	8.9	0.66
16	6 30.3	8 8 31.22	20 46 21.0	1.0	8.7	0.66	Dec. 1	16 49.6	9 32 18.24	15 37 33.2	1.0	8.9	0.66
17	6 26.5	8 8 38.65	+20 46 0.2	1.0	8.7	0.66	2	16 45.6	9 32 18.03	+15 37 46.6	1.0	8.9	0.66
18	6 22.7	8 8 46.52	20 45 38.1	1.0	8.7	0.66	3	16 41.7	9 32 17.38	15 38 2.1	1.0	8.9	0.66
19	6 18.9	8 8 54.82	20 45 14.7	1.0	8.6	0.66	4	16 37.7	9 32 16.29	15 38 19.8	1.0	8.9	0.66
20	6 15.1	8 9 3.55	20 44 49.9	1.0	8.6	0.66	5	16 33.8	9 32 14.75	15 38 39.6	1.0	8.9	0.66
21	6 11.3	8 9 12.71	20 44 23.7	1.0	8.6	0.66	6	16 29.8	9 32 12.78	15 39 1.5	1.0	9.0	0.66
22	6 7.6	8 9 22.29	+20 43 56.2	1.0	8.6	0.66	7	16 25.8	9 32 10.36	+15 39 25.6	1.0	9.0	0.67
23	6 3.8	8 9 32.30	20 43 27.4	1.0	8.6	0.65	8	16 21.8	9 32 7.50	15 39 51.8	1.0	9.0	0.67
24	6 0.1	8 9 42.72	20 42 57.2	1.0	8.6	0.65	9	16 17.9	9 32 4.21	15 40 20.0	1.0	9.0	0.67
25	5 56.3	8 9 53.56	20 42 25.7	1.0	8.6	0.65	10	16 13.9	9 32 0.48	15 40 50.3	1.0	9.0	0.67
26	5 52.6	8 10 4.80	20 41 53.0	1.0	8.5	0.65	11	16 9.9	9 31 56.33	15 41 22.7	1.0	9.0	0.67
27	5 48.8	8 10 16.45	+20 41 18.9	1.0	8.5	0.65	12	16 5.9	9 31 51.74	+15 41 57.2	1.0	9.1	0.67
28	5 45.1	8 10 28.51	20 40 43.5	1.0	8.5	0.65	13	16 1.8	9 31 46.73	15 42 33.7	1.0	9.1	0.67
29	5 41.4	8 10 40.97	20 40 6.9	1.0	8.5	0.65	14	15 57.8	9 31 41.29	15 43 12.1	1.0	9.1	0.67
30	5 37.6	8 10 53.82	20 39 28.9	1.0	8.5	0.65	15	15 53.8	9 31 35.43	15 43 52.6	1.0	9.1	0.68
Nov. 1	5 33.9	8 11 7.07	20 38 49.6	1.0	8.5	0.64	16	15 49.8	9 31 29.16	15 44 35.1	1.0	9.1	0.68
2	18 40.5	9 29 15.82	+15 46 23.6	1.0	8.4	0.62	17	15 45.7	9 31 22.47	+15 45 19.5	1.0	9.1	0.68
3	18 36.8	9 29 27.94	15 45 36.9	1.0	8.4	0.63	18	15 41.7	9 31 15.36	15 46 5.8	1.0	9.2	0.68
4	18 33.1	9 29 39.67	15 44 52.2	1.0	8.5	0.63	19	15 37.6	9 31 7.84	15 46 54.1	1.0	9.2	0.68
5	18 29.3	9 29 51.00	15 44 9.3	1.0	8.5	0.63	20	15 33.5	9 30 59.93	15 47 44.3	1.0	9.2	0.68
6	18 25.6	9 30 1.92	15 43 28.5	1.0	8.5	0.63	21	15 29.5	9 30 51.61	15 48 36.3	1.0	9.2	0.68
7	18 21.8	9 30 12.44	+15 42 49.6	1.0	8.5	0.63	22	15 25.4	9 30 42.68	+15 49 30.2	1.0	9.2	0.68
8	18 18.1	9 30 22.56	15 42 12.6	1.0	8.5	0.63	23	15 21.3	9 30 33.77	15 50 25.9	1.0	9.2	0.68
9	18 14.3	9 30 32.26	15 41 37.7	1.0	8.5	0.63	24	15 17.2	9 30 24.96	15 51 23.4	1.0	9.2	0.68
10	18 10.5	9 30 41.55	15 41 4.7	1.0	8.5	0.63	25	15 13.1	9 30 14.36	15 52 22.6	1.0	9.3	0.69
11	18 6.7	9 30 50.42	15 40 33.8	1.0	8.6	0.63	26	15 9.0	9 30 4.08	15 53 23.6	1.0	9.3	0.69
12	18 2.9	9 30 58.88	+15 40 4.9	1.0	8.6	0.64	27	15 4.9	9 29 53.41	+15 54 26.3	1.0	9.3	0.69
13	17 59.1	9 31 6.92	15 39 38.1	1.0	8.6	0.64	28	15 0.8	9 29 42.37	15 55 30.7	1.0	9.3	0.69
14	17 55.3	9 31 14.54	15 39 13.3	1.0	8.6	0.64	29	14 56.7	9 29 30.97	15 56 36.7	1.0	9.3	0.69
15	17 51.5	9 31 21.74	15 38 50.5	1.0	8.6	0.64	30	14 52.6	9 29 19.20	15 57 44.3	1.0	9.3	0.69
16	17 47.7	9 31 28.52	15 38 29.8	1.0	8.7	0.64	31	14 48.4	9 29 7.08	15 58 53.5	1.1	9.3	0.69
17	17 43.9	9 31 34.87	+15 38 11.2	1.0	8.7	0.64	32	14 44.3	9 28 54.60	+16 0 4.2	1.1	9.3	0.69
	17 40.0	9 31 40.79	+15 37 54.7	1.0	8.7	0.64		14 40.1	9 28 41.77	+16 1 16.5	1.1	9.4	0.69

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 1	18 17.8	13 3 57.44	-6 5 47.3	0.5	1.8	0.12	Feb. 15	15 20.4	13 3 33.06	-6 1 47.8	0.5	1.9	0.13
2	18 13.9	13 4 1.42	6 6 9.8	0.5	1.8	0.12	16	15 16.4	13 3 28.02	6 1 15.0	0.5	1.9	0.13
3	18 10.0	13 4 5.19	6 6 31.1	0.5	1.8	0.12	17	15 12.4	13 3 22.80	6 0 41.1	0.5	1.9	0.13
4	18 6.2	13 4 8.76	6 6 51.1	0.5	1.8	0.12	18	15 8.4	13 3 17.42	6 0 6.3	0.5	1.9	0.13
5	18 2.3	13 4 12.13	6 7 9.8	0.5	1.8	0.12	19	15 4.4	13 3 11.87	5 59 30.4	0.5	1.9	0.13
6	17 58.4	13 4 15.29	-6 7 27.2	0.5	1.8	0.12	20	15 0.4	13 3 6.16	-5 58 53.6	0.5	1.9	0.13
7	17 54.5	13 4 18.25	6 7 43.3	0.5	1.8	0.12	21	14 56.3	13 3 0.28	5 58 15.8	0.5	1.9	0.13
8	17 50.7	13 4 21.00	6 7 58.2	0.5	1.8	0.12	22	14 52.3	13 2 54.25	5 57 37.0	0.5	1.9	0.13
9	17 46.8	13 4 23.54	6 8 11.8	0.5	1.8	0.12	23	14 48.3	13 2 48.06	5 56 57.3	0.5	1.9	0.13
10	17 42.9	13 4 25.87	6 8 24.1	0.5	1.8	0.12	24	14 44.2	13 2 41.72	5 56 16.7	0.5	1.9	0.13
11	17 39.0	13 4 27.99	-6 8 35.1	0.5	1.8	0.12	25	14 40.2	13 2 35.23	-5 55 35.1	0.5	1.9	0.13
12	17 35.1	13 4 29.91	6 8 44.8	0.5	1.8	0.12	26	14 36.1	13 2 28.59	5 54 52.7	0.5	1.9	0.13
13	17 31.2	13 4 31.61	6 8 53.2	0.5	1.8	0.12	27	14 32.1	13 2 21.81	5 54 9.5	0.5	1.9	0.13
14	17 27.3	13 4 33.10	6 9 0.3	0.5	1.8	0.12	28	14 28.0	13 2 14.89	5 53 25.4	0.5	1.9	0.13
15	17 23.4	13 4 34.38	6 9 6.1	0.5	1.8	0.12	29	14 24.0	13 2 7.83	5 52 40.4	0.5	1.9	0.13
16	17 19.4	13 4 35.45	-6 9 10.7	0.5	1.8	0.12	Mar. 1	14 19.9	13 2 0.63	-5 51 54.7	0.5	1.9	0.13
17	17 15.5	13 4 36.31	6 9 13.9	0.5	1.8	0.12	2	14 15.9	13 1 53.31	5 51 8.2	0.5	1.9	0.13
18	17 11.6	13 4 36.96	6 9 15.8	0.5	1.8	0.12	3	14 11.9	13 1 45.85	5 50 20.9	0.5	1.9	0.13
19	17 7.7	13 4 37.41	6 9 16.5	0.5	1.8	0.12	4	14 7.8	13 1 38.27	5 49 32.8	0.5	1.9	0.13
20	17 3.7	13 4 37.64	6 9 15.9	0.5	1.8	0.12	5	14 3.7	13 1 30.56	5 48 44.0	0.5	1.9	0.13
21	16 59.8	13 4 37.67	-6 9 14.0	0.5	1.9	0.12	6	13 59.6	13 1 22.74	-5 47 54.5	0.5	1.9	0.13
22	16 55.9	13 4 37.48	6 9 10.8	0.5	1.9	0.12	7	13 55.6	13 1 14.80	5 47 4.4	0.5	1.9	0.13
23	16 51.9	13 4 37.09	6 9 6.3	0.5	1.9	0.12	8	13 51.5	13 1 6.75	5 46 13.5	0.5	1.9	0.13
24	16 48.0	13 4 36.50	6 9 0.6	0.5	1.9	0.12	9	13 47.4	13 0 58.59	5 45 22.1	0.5	1.9	0.13
25	16 44.1	13 4 35.70	6 8 53.6	0.5	1.9	0.12	10	13 43.4	13 0 50.32	5 44 30.0	0.5	1.9	0.13
26	16 40.1	13 4 34.69	-6 8 45.4	0.5	1.9	0.12	11	13 39.3	13 0 41.96	-5 43 37.3	0.5	1.9	0.13
27	16 36.2	13 4 33.48	6 8 35.9	0.5	1.9	0.12	12	13 35.2	13 0 33.50	5 42 43.9	0.5	1.9	0.13
28	16 32.2	13 4 32.07	6 8 25.2	0.5	1.9	0.12	13	13 31.2	13 0 24.94	5 41 50.1	0.5	1.9	0.13
29	16 28.2	13 4 30.46	6 8 13.2	0.5	1.9	0.13	14	13 27.1	13 0 16.29	5 40 55.8	0.5	1.9	0.13
30	16 24.3	13 4 28.64	6 8 0.0	0.5	1.9	0.13	15	13 23.0	13 0 7.57	5 40 1.0	0.5	1.9	0.13
31	16 20.3	13 4 26.62	-6 7 45.6	0.5	1.9	0.13	16	13 18.9	12 59 58.76	-5 39 5.6	0.5	1.9	0.13
Feb. 1	16 16.3	13 4 24.40	6 7 30.0	0.5	1.9	0.13	17	13 14.9	12 59 49.87	5 38 9.8	0.5	1.9	0.13
2	16 12.4	13 4 21.99	6 7 13.1	0.5	1.9	0.13	18	13 10.8	12 59 40.91	5 37 13.7	0.5	1.9	0.13
3	16 8.4	13 4 19.37	6 6 55.0	0.5	1.9	0.13	19	13 6.7	12 59 31.89	5 36 17.1	0.5	1.9	0.13
4	16 4.4	13 4 16.56	6 6 35.8	0.5	1.9	0.13	20	13 2.6	12 59 22.79	5 35 20.2	0.5	1.9	0.13
5	16 0.4	13 4 13.55	-6 6 15.4	0.5	1.9	0.13	21	12 58.5	12 59 13.64	-5 34 22.9	0.5	1.9	0.13
6	15 56.5	13 4 10.34	6 5 53.7	0.5	1.9	0.13	22	12 54.4	12 59 4.44	5 33 25.3	0.5	1.9	0.13
7	15 52.5	13 4 6.95	6 5 30.9	0.5	1.9	0.13	23	12 50.3	12 58 55.19	5 32 27.5	0.5	1.9	0.13
8	15 48.5	13 4 3.37	6 5 7.0	0.5	1.9	0.13	24	12 46.3	12 58 45.88	5 31 29.3	0.5	1.9	0.13
9	15 44.5	13 3 59.59	6 4 41.9	0.5	1.9	0.13	25	12 42.2	12 58 36.53	5 30 30.9	0.5	1.9	0.13
10	15 40.5	13 3 55.62	-6 4 15.6	0.5	1.9	0.13	26	12 38.1	12 58 27.15	-5 29 32.4	0.5	1.9	0.13
11	15 36.5	13 3 51.47	6 3 48.3	0.5	1.9	0.13	27	12 34.0	12 58 17.73	5 28 33.6	0.5	1.9	0.13
12	15 32.5	13 3 47.14	6 3 19.8	0.5	1.9	0.13	28	12 29.9	12 58 8.27	5 27 34.7	0.5	1.9	0.13
13	15 28.5	13 3 42.63	6 2 50.2	0.5	1.9	0.13	29	12 25.8	12 57 58.78	5 26 35.6	0.5	1.9	0.13
14	15 24.5	13 3 37.93	6 2 19.5	0.5	1.9	0.13	30	12 21.8	12 57 49.28	5 25 36.4	0.5	1.9	0.13
15	15 20.4	13 3 33.06	-6 1 47.8	0.5	1.9	0.13	31	12 17.7	12 57 39.75	-5 24 37.1	0.5	1.9	0.13
16	15 16.4	13 3 28.02	-6 1 15.0	0.5	1.9	0.13	Apr. 1	12 13.5	12 57 30.21	-5 23 37.8	0.5	1.9	0.13

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	"		h m	h m s	° ' "	"	"	"
Apr. 1	12 13.5	12 57 30.21	-5 23 37.8	0.5	1.9	0.13	May 16	9 10.3	12 51 9.59	-4 44 46.3	0.5	1.9	0.13
2	12 9.5	12 57 20.65	5 22 38.4	0.5	1.9	0.13	17	9 6.3	12 51 3.52	4 44 10.2	0.5	1.9	0.13
3	12 5.4	12 57 11.09	5 21 39.0	0.5	1.9	0.13	18	9 2.2	12 50 57.60	4 43 35.0	0.5	1.9	0.13
4	12 1.3	12 57 1.52	5 20 39.6	0.5	1.9	0.13	19	8 58.2	12 50 51.83	4 43 0.8	0.5	1.9	0.13
5	11 57.2	12 56 51.95	5 19 10.2	0.5	1.9	0.13	20	8 54.2	12 50 46.22	4 42 27.6	0.5	1.9	0.13
6	11 53.1	12 56 42.39	-5 18 40.9	0.5	1.9	0.13	21	8 50.2	12 50 40.77	-4 41 55.5	0.5	1.9	0.13
7	11 49.0	12 56 32.84	5 17 41.7	0.5	1.9	0.13	22	8 46.1	12 50 35.48	4 41 24.4	0.5	1.9	0.13
8	11 44.9	12 56 23.30	5 16 42.6	0.5	1.9	0.13	23	8 42.1	12 50 30.35	4 40 54.3	0.5	1.9	0.13
9	11 40.8	12 56 13.78	5 15 43.6	0.5	1.9	0.13	24	8 38.1	12 50 25.38	4 40 25.2	0.5	1.9	0.13
10	11 36.7	12 56 4.27	5 14 44.9	0.5	1.9	0.13	25	8 34.1	12 50 20.57	4 39 57.3	0.5	1.9	0.13
11	11 32.6	12 55 54.80	-5 13 46.3	0.5	1.9	0.13	26	8 30.1	12 50 15.94	-4 39 30.4	0.5	1.9	0.13
12	11 28.5	12 55 45.36	5 12 48.0	0.5	1.9	0.13	27	8 26.1	12 50 11.47	4 39 4.6	0.5	1.9	0.13
13	11 24.5	12 55 35.95	5 11 49.8	0.5	1.9	0.13	28	8 22.1	12 50 7.17	4 38 39.8	0.5	1.9	0.13
14	11 20.4	12 55 26.53	5 10 51.9	0.5	1.9	0.13	29	8 18.1	12 50 3.04	4 38 16.2	0.5	1.9	0.13
15	11 16.3	12 55 17.26	5 9 54.4	0.5	1.9	0.13	30	8 14.1	12 49 59.09	4 37 53.7	0.5	1.9	0.13
16	11 12.2	12 55 7.99	-5 8 57.2	0.5	1.9	0.13	31	8 10.1	12 49 55.31	-4 37 32.3	0.5	1.9	0.13
17	11 8.1	12 54 58.76	5 8 0.4	0.5	1.9	0.13	June 1	8 6.1	12 49 51.70	4 37 12.1	0.5	1.9	0.13
18	11 4.1	12 54 49.59	5 7 3.9	0.5	1.9	0.13	2	8 2.1	12 49 48.28	4 36 52.9	0.5	1.9	0.13
19	11 0.0	12 54 40.48	5 6 7.9	0.5	1.9	0.13	3	7 58.1	12 49 45.04	4 36 35.0	0.5	1.9	0.13
20	10 55.9	12 54 31.44	5 5 12.3	0.5	1.9	0.13	4	7 54.1	12 49 41.98	4 36 18.1	0.5	1.9	0.13
21	10 51.8	12 54 22.45	-5 4 17.1	0.5	1.9	0.13	5	7 50.2	12 49 39.10	-4 36 2.5	0.5	1.9	0.13
22	10 47.7	12 54 13.54	5 3 22.4	0.5	1.9	0.13	6	7 46.2	12 49 36.40	4 35 48.0	0.5	1.9	0.13
23	10 43.6	12 54 4.71	5 2 28.2	0.5	1.9	0.13	7	7 42.2	12 49 33.89	4 35 34.7	0.5	1.9	0.13
24	10 39.6	12 53 55.96	5 1 34.5	0.5	1.9	0.13	8	7 38.2	12 49 31.58	4 35 22.7	0.5	1.9	0.12
25	10 35.5	12 53 47.28	5 0 41.4	0.5	1.9	0.13	9	7 34.3	12 49 29.44	4 35 11.8	0.5	1.9	0.12
26	10 31.4	12 53 39.68	-4 59 48.8	0.5	1.9	0.13	10	7 30.3	12 49 27.50	-4 35 2.1	0.5	1.9	0.12
27	10 27.3	12 53 30.18	4 58 56.8	0.5	1.9	0.13	11	7 26.3	12 49 25.74	4 34 53.6	0.5	1.9	0.12
28	10 23.3	12 53 21.77	4 58 5.4	0.5	1.9	0.13	12	7 22.4	12 49 24.18	4 34 46.3	0.5	1.9	0.12
29	10 19.2	12 53 13.45	4 57 14.6	0.5	1.9	0.13	13	7 18.4	12 49 22.81	4 34 40.3	0.5	1.9	0.12
30	10 15.1	12 53 5.22	4 56 24.5	0.5	1.9	0.13	14	7 14.5	12 49 21.63	4 34 35.5	0.5	1.9	0.12
May 1	10 11.0	12 52 57.10	-4 55 35.0	0.5	1.9	0.13	15	7 10.5	12 49 20.64	-4 34 31.9	0.5	1.9	0.12
2	10 7.0	12 52 49.08	4 54 46.2	0.5	1.9	0.13	16	7 6.6	12 49 19.84	4 34 29.5	0.5	1.9	0.12
3	10 2.9	12 52 41.17	4 53 58.1	0.5	1.9	0.13	17	7 2.6	12 49 19.24	4 34 28.4	0.5	1.9	0.12
4	9 58.9	12 52 33.37	4 53 10.7	0.5	1.9	0.13	18	6 58.7	12 49 18.83	4 34 28.5	0.5	1.9	0.12
5	9 54.8	12 52 25.68	4 52 24.1	0.5	1.9	0.13	19	6 54.8	12 49 18.62	4 34 29.8	0.5	1.9	0.12
6	9 50.7	12 52 18.11	-4 51 38.3	0.5	1.9	0.13	20	6 50.8	12 49 18.60	-4 34 32.3	0.5	1.9	0.12
7	9 46.7	12 52 10.66	4 50 53.3	0.5	1.9	0.13	21	6 46.9	12 49 18.77	4 34 36.1	0.5	1.8	0.12
8	9 42.6	12 52 3.34	4 50 9.0	0.5	1.9	0.13	22	6 43.0	12 49 19.13	4 34 41.0	0.5	1.8	0.12
9	9 38.6	12 51 56.15	4 49 25.6	0.5	1.9	0.13	23	6 39.1	12 49 19.69	4 34 47.2	0.5	1.8	0.12
10	9 34.5	12 51 49.08	4 48 43.0	0.5	1.9	0.13	24	6 35.1	12 49 20.44	4 34 54.7	0.5	1.8	0.12
11	9 30.5	12 51 42.15	-4 48 1.3	0.5	1.9	0.13	25	6 31.2	12 49 21.39	-4 35 3.3	0.5	1.8	0.12
12	9 26.4	12 51 35.36	4 47 20.4	0.5	1.9	0.13	26	6 27.3	12 49 22.53	4 35 13.2	0.5	1.8	0.12
13	9 22.4	12 51 28.70	4 46 40.5	0.5	1.9	0.13	27	6 23.4	12 49 23.86	4 35 24.3	0.5	1.8	0.12
14	9 18.3	12 51 22.19	4 46 1.5	0.5	1.9	0.13	28	6 19.5	12 49 25.38	4 35 36.6	0.5	1.8	0.12
15	9 14.3	12 51 15.82	4 45 23.4	0.5	1.9	0.13	29	6 15.6	12 49 27.10	4 35 50.2	0.5	1.8	0.12
16	9 10.3	12 51 9.59	-4 44 46.3	0.5	1.9	0.13	30	6 11.7	12 49 29.01	-4 36 4.9	0.5	1.8	0.12
17	9 6.3	12 51 3.52	-4 44 10.2	0.5	1.9	0.13	July 1	6 7.8	12 49 31.12	-4 36 20.9	0.5	1.8	0.12

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi- diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 1	8 58.4	3 43 1.45	+17 57 6.1	0.3	1.3	0.09	Feb. 15	6 0.1	3 41 38.64	+17 55 12.8	0.3	1.3	0.09
2	8 54.4	3 42 56.86	17 56 53.9	0.3	1.3	0.09	16	5 56.2	3 41 39.95	17 55 21.0	0.3	1.3	0.09
3	8 50.4	3 42 52.38	17 56 42.0	0.3	1.3	0.09	17	5 52.3	3 41 41.40	17 55 29.7	0.3	1.3	0.09
4	8 46.4	3 42 48.00	17 56 30.6	0.3	1.3	0.09	18	5 48.4	3 41 43.00	17 55 38.8	0.3	1.3	0.09
5	8 42.4	3 42 43.73	17 56 19.6	0.3	1.3	0.09	19	5 44.5	3 41 44.73	17 55 48.4	0.3	1.3	0.09
6	8 38.4	3 42 39.57	+17 56 9.0	0.3	1.3	0.09	20	5 40.6	3 41 46.60	+17 55 58.4	0.3	1.3	0.09
7	8 34.4	3 42 35.52	17 55 58.8	0.3	1.3	0.09	21	5 36.7	3 41 48.61	17 56 8.9	0.3	1.3	0.09
8	8 30.4	3 42 31.59	17 55 49.0	0.3	1.3	0.09	22	5 32.8	3 41 50.76	17 56 19.8	0.3	1.3	0.09
9	8 26.4	3 42 27.77	17 55 39.6	0.3	1.3	0.09	23	5 28.9	3 41 53.05	17 56 31.2	0.3	1.3	0.09
10	8 22.4	3 42 24.07	17 55 30.6	0.3	1.3	0.09	24	5 25.0	3 41 55.47	17 56 43.0	0.3	1.3	0.09
11	8 18.4	3 42 20.49	+17 55 22.1	0.3	1.3	0.09	25	5 21.1	3 41 58.03	+17 56 55.2	0.3	1.3	0.09
12	8 14.4	3 42 17.04	17 55 14.0	0.3	1.3	0.09	26	5 17.2	3 42 0.73	17 57 7.9	0.3	1.3	0.09
13	8 10.4	3 42 13.70	17 55 6.4	0.3	1.3	0.09	27	5 13.3	3 42 3.56	17 57 21.0	0.3	1.3	0.09
14	8 6.4	3 42 10.49	17 54 59.2	0.3	1.3	0.09	28	5 9.4	3 42 6.53	17 57 34.5	0.3	1.3	0.09
15	8 2.4	3 42 7.41	17 54 52.4	0.3	1.3	0.09	29	5 5.6	3 42 9.63	17 57 48.4	0.3	1.3	0.09
16	7 58.5	3 42 4.45	+17 54 46.0	0.3	1.3	0.09	Sept. 1	17 14.3	4 2 23.92	+18 59 17.0	0.3	1.3	0.09
17	7 54.5	3 42 1.62	17 54 40.1	0.3	1.3	0.09	2	17 10.5	4 2 24.18	18 59 14.5	0.3	1.3	0.09
18	7 50.5	3 41 58.92	17 54 34.7	0.3	1.3	0.09	3	17 6.6	4 2 24.31	18 59 11.6	0.3	1.3	0.09
19	7 46.5	3 41 56.35	17 54 29.7	0.3	1.3	0.09	4	17 2.6	4 2 24.30	18 59 8.4	0.3	1.3	0.09
20	7 42.6	3 41 53.92	17 54 25.2	0.3	1.3	0.09	5	16 58.7	4 2 24.14	18 59 4.7	0.3	1.3	0.09
21	7 38.6	3 41 51.81	+17 54 21.2	0.3	1.3	0.09	6	16 54.7	4 2 23.85	+18 59 0.7	0.3	1.3	0.09
22	7 34.6	3 41 49.44	17 54 17.6	0.3	1.3	0.09	7	16 50.8	4 2 23.42	18 58 56.3	0.3	1.3	0.09
23	7 30.7	3 41 47.40	17 54 14.5	0.3	1.3	0.09	8	16 46.9	4 2 22.86	18 58 51.5	0.3	1.3	0.09
24	7 26.7	3 41 45.50	17 54 11.8	0.3	1.3	0.09	9	16 42.9	4 2 22.16	18 58 46.4	0.3	1.3	0.09
25	7 22.7	3 41 43.73	17 54 9.6	0.3	1.3	0.09	10	16 39.0	4 2 21.33	18 58 40.8	0.3	1.3	0.09
26	7 18.8	3 41 42.10	+17 54 7.9	0.3	1.3	0.09	11	16 35.0	4 2 20.36	+18 58 34.9	0.3	1.3	0.09
27	7 14.8	3 41 40.60	17 54 6.7	0.3	1.3	0.09	12	16 31.1	4 2 19.25	18 58 28.6	0.3	1.3	0.09
28	7 10.9	3 41 39.24	17 54 5.9	0.3	1.3	0.09	13	16 27.1	4 2 18.00	18 58 22.0	0.3	1.3	0.09
29	7 6.9	3 41 38.02	17 54 5.6	0.3	1.3	0.09	14	16 23.2	4 2 16.62	18 58 15.0	0.3	1.3	0.09
30	7 3.0	3 41 36.94	17 54 5.8	0.3	1.3	0.09	15	16 19.2	4 2 15.11	18 58 7.6	0.3	1.3	0.09
31	6 59.0	3 41 35.99	+17 54 6.4	0.3	1.3	0.09	16	16 15.2	4 2 13.47	+18 57 59.9	0.3	1.3	0.09
Feb. 1	6 55.1	3 41 35.18	17 54 7.5	0.3	1.3	0.09	17	16 11.3	4 2 11.69	18 57 51.8	0.3	1.3	0.09
2	6 51.1	3 41 34.51	17 54 9.1	0.3	1.3	0.09	18	16 7.3	4 2 9.78	18 57 43.4	0.3	1.3	0.09
3	6 47.2	3 41 33.98	17 54 11.2	0.3	1.3	0.09	19	16 3.4	4 2 7.74	18 57 34.6	0.3	1.3	0.09
4	6 43.2	3 41 33.59	17 54 13.7	0.3	1.3	0.09	20	15 59.4	4 2 5.57	18 57 25.5	0.3	1.3	0.09
5	6 39.3	3 41 33.34	+17 54 16.7	0.3	1.3	0.09	21	15 55.4	4 2 3.27	+18 57 16.0	0.3	1.3	0.09
6	6 35.4	3 41 33.23	17 54 20.2	0.3	1.3	0.09	22	15 51.4	4 2 0.84	18 57 6.2	0.3	1.3	0.09
7	6 31.4	3 41 33.27	17 54 24.2	0.3	1.3	0.09	23	15 47.5	4 1 58.28	18 56 56.1	0.3	1.3	0.09
8	6 27.5	3 41 33.44	17 54 28.6	0.3	1.3	0.09	24	15 43.5	4 1 55.60	18 56 45.6	0.3	1.3	0.09
9	6 23.6	3 41 33.76	17 54 33.5	0.3	1.3	0.09	25	15 39.5	4 1 52.80	18 56 34.8	0.3	1.3	0.09
10	6 19.7	3 41 34.22	+17 54 38.9	0.3	1.3	0.09	26	15 35.5	4 1 49.87	+18 56 23.7	0.3	1.3	0.09
11	6 15.7	3 41 34.82	17 54 44.7	0.3	1.3	0.09	27	15 31.6	4 1 46.81	18 56 12.3	0.3	1.3	0.09
12	6 11.8	3 41 35.56	17 54 51.0	0.3	1.3	0.09	28	15 27.6	4 1 43.63	18 56 0.4	0.3	1.3	0.09
13	6 7.9	3 41 36.45	17 54 57.8	0.3	1.3	0.09	29	15 23.6	4 1 40.32	18 55 48.3	0.3	1.3	0.09
14	6 4.0	3 41 37.47	17 55 5.1	0.3	1.3	0.09	30	15 19.6	4 1 36.90	18 55 35.9	0.3	1.3	0.09
15	6 0.1	3 41 38.64	+17 55 12.8	0.3	1.3	0.09	Oct. 1	15 15.6	4 1 33.36	+18 55 23.1	0.3	1.3	0.09
16	5 56.2	3 41 39.95	+17 55 21.0	0.3	1.3	0.09	2	15 11.6	4 1 29.70	+18 55 10.1	0.3	1.3	0.09

## FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.	Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Oct. 1	15 15.6	4 1 33.36	+18 55 23.1	0.3	1.3	0.09	Nov. 16	12 10.4	3 57 12.34	+18 41 37.9	0.3	1.3	0.09
2	15 11.6	4 1 29.70	18 55 10.1	0.3	1.3	0.09	17	12 6.4	3 57 5.38	18 41 17.3	0.3	1.3	0.09
3	15 7.6	4 1 25.92	18 54 56.8	0.3	1.3	0.09	18	12 2.3	3 56 58.41	18 40 56.7	0.3	1.3	0.09
4	15 3.6	4 1 22.03	18 54 43.1	0.3	1.3	0.09	19	11 58.3	3 56 51.43	18 40 36.2	0.3	1.3	0.09
5	14 59.6	4 1 18.02	18 54 29.2	0.3	1.3	0.09	20	11 54.2	3 56 44.45	18 40 15.7	0.3	1.3	0.09
6	14 55.6	4 1 13.90	+18 54 14.9	0.3	1.3	0.09	21	11 50.2	3 56 37.45	+18 39 55.2	0.3	1.3	0.09
7	14 51.6	4 1 9.65	18 54 0.4	0.3	1.3	0.09	22	11 46.1	3 56 30.45	18 39 34.7	0.3	1.3	0.09
8	14 47.6	4 1 5.31	18 53 45.6	0.3	1.3	0.09	23	11 42.1	3 56 23.44	18 39 14.2	0.3	1.3	0.09
9	14 43.6	4 1 0.86	18 53 30.6	0.3	1.3	0.09	24	11 38.0	3 56 16.43	18 38 53.7	0.3	1.3	0.09
10	14 39.6	4 0 56.31	18 53 15.3	0.3	1.3	0.09	25	11 34.0	3 56 9.43	18 38 33.4	0.3	1.3	0.09
11	14 35.6	4 0 51.66	+18 52 59.7	0.3	1.3	0.09	26	11 29.9	3 56 2.45	+18 38 13.2	0.3	1.3	0.09
12	14 31.6	4 0 46.90	18 52 43.9	0.3	1.3	0.09	27	11 25.9	3 55 55.48	18 37 53.0	0.3	1.3	0.09
13	14 27.6	4 0 42.04	18 52 27.8	0.3	1.3	0.09	28	11 21.8	3 55 48.53	18 37 33.0	0.3	1.3	0.09
14	14 23.6	4 0 37.08	18 52 11.5	0.3	1.3	0.09	29	11 17.8	3 55 41.59	18 37 13.0	0.3	1.3	0.09
15	14 19.5	4 0 32.02	18 51 54.9	0.3	1.3	0.09	30	11 13.7	3 55 34.67	18 36 53.2	0.3	1.3	0.09
16	14 15.5	4 0 26.87	+18 51 38.1	0.3	1.3	0.09	Dec. 1	11 9.7	3 55 27.76	+18 36 33.4	0.3	1.3	0.09
17	14 11.5	4 0 21.63	18 51 21.1	0.3	1.3	0.09	2	11 5.6	3 55 20.88	18 36 13.7	0.3	1.3	0.09
18	14 7.5	4 0 16.30	18 51 3.8	0.3	1.3	0.09	3	11 1.6	3 55 14.04	18 35 54.2	0.3	1.3	0.09
19	14 3.5	4 0 10.88	18 50 46.4	0.3	1.3	0.09	4	10 57.6	3 55 7.23	18 35 34.9	0.3	1.3	0.09
20	13 59.4	4 0 5.38	18 50 28.7	0.3	1.3	0.09	5	10 53.5	3 55 0.46	18 35 15.7	0.3	1.3	0.09
21	13 55.4	3 59 59.79	+18 50 10.8	0.3	1.3	0.09	6	10 49.5	3 54 53.73	+18 34 56.7	0.3	1.3	0.09
22	13 51.4	3 59 54.11	18 49 52.8	0.3	1.3	0.09	7	10 45.4	3 54 47.03	18 34 37.9	0.3	1.3	0.09
23	13 47.4	3 59 48.35	18 49 34.5	0.3	1.3	0.09	8	10 41.4	3 54 40.37	18 34 19.2	0.3	1.3	0.09
24	13 43.3	3 59 42.52	18 49 16.1	0.3	1.3	0.09	9	10 37.3	3 54 33.75	18 34 0.7	0.3	1.3	0.09
25	13 39.3	3 59 36.61	18 48 57.5	0.3	1.3	0.09	10	10 33.3	3 54 27.18	18 33 42.4	0.3	1.3	0.09
26	13 35.3	3 59 30.63	+18 48 38.7	0.3	1.3	0.09	11	10 29.3	3 54 20.67	+18 33 24.3	0.3	1.3	0.09
27	13 31.2	3 59 24.58	18 48 19.8	0.3	1.3	0.09	12	10 25.2	3 54 14.22	18 33 6.4	0.3	1.3	0.09
28	13 27.2	3 59 18.47	18 48 0.7	0.3	1.3	0.09	13	10 21.2	3 54 7.83	18 32 48.8	0.3	1.3	0.09
29	13 23.2	3 59 12.28	18 47 41.4	0.3	1.3	0.09	14	10 17.1	3 54 1.50	18 32 31.4	0.3	1.3	0.09
30	13 19.1	3 59 6.02	18 47 22.0	0.3	1.3	0.09	15	10 13.1	3 53 55.23	18 32 14.2	0.3	1.3	0.09
31	13 15.1	3 58 59.69	+18 47 2.4	0.3	1.3	0.09	16	10 9.1	3 53 49.01	+18 31 57.2	0.3	1.3	0.09
Nov. 1	13 11.1	3 58 53.31	18 46 42.7	0.3	1.3	0.09	17	10 5.0	3 53 42.85	18 31 40.5	0.3	1.3	0.09
2	13 7.0	3 58 46.88	18 46 23.0	0.3	1.3	0.09	18	10 1.0	3 53 36.76	18 31 24.0	0.3	1.3	0.09
3	13 3.0	3 58 40.39	18 46 3.1	0.3	1.3	0.09	19	9 57.0	3 53 30.75	18 31 7.8	0.3	1.3	0.09
4	12 58.9	3 58 33.86	18 45 43.1	0.3	1.3	0.09	20	9 52.9	3 53 24.82	18 30 51.9	0.3	1.3	0.09
5	12 54.9	3 58 27.27	+18 45 23.0	0.3	1.3	0.09	21	9 48.9	3 53 18.97	+18 30 36.3	0.3	1.3	0.09
6	12 50.9	3 58 20.64	18 45 2.9	0.3	1.3	0.09	22	9 44.9	3 53 13.19	18 30 20.9	0.3	1.3	0.09
7	12 46.8	3 58 13.95	18 44 42.6	0.3	1.3	0.09	23	9 40.8	3 53 7.49	18 30 5.8	0.3	1.3	0.09
8	12 42.8	3 58 7.22	18 44 22.2	0.3	1.3	0.09	24	9 36.8	3 53 1.87	18 29 51.0	0.3	1.3	0.09
9	12 38.7	3 58 0.46	18 44 1.8	0.3	1.3	0.09	25	9 32.8	3 52 56.33	18 29 36.5	0.3	1.3	0.09
10	12 34.7	3 57 53.68	+18 43 41.3	0.3	1.3	0.09	26	9 28.8	3 52 50.87	+18 29 22.3	0.3	1.3	0.09
11	12 30.7	3 57 46.86	18 43 20.8	0.3	1.3	0.09	27	9 24.8	3 52 45.51	18 29 8.4	0.3	1.3	0.09
12	12 26.6	3 57 40.01	18 43 0.3	0.3	1.3	0.09	28	9 20.7	3 52 40.25	18 28 54.9	0.3	1.3	0.09
13	12 22.6	3 57 33.14	18 42 39.7	0.3	1.3	0.09	29	9 16.7	3 52 35.09	18 28 41.7	0.3	1.3	0.09
14	12 18.5	3 57 26.23	18 42 19.1	0.3	1.3	0.09	30	9 12.7	3 52 30.02	18 28 28.8	0.3	1.3	0.09
15	12 14.5	3 57 19.29	+18 41 58.5	0.3	1.3	0.09	31	9 8.7	3 52 25.04	+18 28 16.3	0.3	1.3	0.09
16	12 10.4	3 57 12.34	+18 41 37.9	0.3	1.3	0.09	32	9 4.7	3 52 20.16	+18 28 4.1	0.3	1.3	0.09

*PART III*

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P H E N O M E N A



## ECLIPSES IN 1888.

In the year 1888 there will be five eclipses, three of the sun and two of the moon.

I.—*A Total Eclipse of the Moon*, 1888, January 28, visible at Washington, and generally throughout North and South America, Europe, Asia and Africa.

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, January 28					
	<sup>d</sup>	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>	
Sun's right ascension	20	43	52.65		Hourly motion 10.31
Moon's right ascension	8	43	52.65		Hourly motion 142.56
Sun's declination	18	8	11.9	S.	Hourly motion 39.7 N.
Moon's declination	18	1	43.2	N.	Hourly motion 5 52.5 S.
Sun's equa. hor. parallax			9.0		Sun's true semidiameter 16 14.4
Moon's equa. hor. parallax	58	11.1			Moon's true semidiameter 15 50.6

## TIMES OF THE PHASES.

Greenwich Mean Time.			Washington Mean Time.		
	<sup>d</sup>	<sup>h</sup>	<sup>m</sup>	<sup>d</sup>	<sup>h</sup>
Moon enters penumbra	January	28	8 27.7	January	28 3 19.5
Moon enters shadow		28	9 30.4		28 4 22.2
Total eclipse begins		28	10 30.9		28 5 22.7
Middle of the eclipse		28	11 20.1		28 6 11.9
Total eclipse ends		28	12 9.2		28 7 1.0
Moon leaves shadow		28	13 9.5		28 8 1.3
Moon leaves penumbra		28	14 11.9		28 9 3.7

## CIRCUMSTANCES OF THE ECLIPSE.

Contacts of Shadow with moon's limb.	Angles of position from north point.	The moon being in the zenith in longitude from Greenwich and latitude.	
First	93° to E.	39° 40.2 E.	18° 12.5 N.
Last	74 to W.	13 4.8 W.	17 50.5 N.

Magnitude of the eclipse = 1.647, (moon's diameter = 1).

II.—*A Partial Eclipse of the Sun*, 1888, February 11, invisible at Washington.

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, February 11					
	<sup>d</sup>	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>	
Sun and moon's R. A.	21	40	16.10		Hourly motions 9.85 and 129.24
Sun's declination	13	57	2.2	S.	Hourly motion 49.5 N.
Moon's declination	15	10	10.3	S.	Hourly motion 7 43.2 N.
Sun's equa. hor. parallax			9.0		Sun's true semidiameter 16 12.1
Moon's equa. hor. parallax	56	12.3			Moon's true semidiameter 15 18.2

## CIRCUMSTANCES OF THE ECLIPSE.

Eclipse begins	February	11	9 55.3	in long. 93° 57.2 E. and in lat. 64° 7.8 S.
Greatest eclipse		11	11 38.2	35 27.0 W. 70 48.4 S.
Eclipse ends		11	13 21.5	94 54.6 W. 39 40.2 S.

Magnitude of greatest eclipse = 0.502, (sun's diameter = 1).

III.—*A Partial Eclipse of the Sun*, 1888, July 8, invisible at Washington.

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\odot$ in right ascension, July 8 18 35 30.6			
Sun and moon's R. A.	<sup>h</sup> 7 <sup>m</sup> 15 <sup>s</sup> 29.63	Hourly motions	<sup>s</sup> 10.22 and 135.20
Sun's declination	22° 19' 4.7" N.	Hourly motion	' 18.4 S.
Moon's declination	21° 7' 54.4" N.	Hourly motion	1 14.8 S.
Sun's equa. hor. parallax	8.7	Sun's true semidiameter	15 44.0
Moon's equa. hor. parallax	55 42.9	Moon's true semidiameter	15 10.2

## CIRCUMSTANCES OF THE ECLIPSE.

Eclipse begins	July 8 16 50.1 in long.	46° 9.6' E. and in lat.	48° 17.8' S.
Greatest eclipse	8 18 30.9	78 49.1 E.	67 36.6 S.
Eclipse ends	8 20 11.6	117 37.1 E.	51 13.4 S.

Magnitude of the eclipse = 0.500, (sun's diameter = 1).

IV.—*A Total Eclipse of the Moon*, 1888, July 22, visible at Washington, and generally throughout North and South America, and portions of Europe, Africa and the Pacific Ocean.

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\odot$ in right ascension, July 22 17 44 29.5			
Sun's right ascension	<sup>h</sup> 8 <sup>m</sup> 11 <sup>s</sup> 48.02	Hourly motion	<sup>s</sup> 9.92
Moon's right ascension	20 11 48.02	Hourly motion	147.84
Sun's declination	20° 0' 12.7" N.	Hourly motion	' 31.0 S.
Moon's declination	20° 1' 44.7" S.	Hourly motion	4 24.0 N.
Sun's equa. hor. parallax	8.7	Sun's true semidiameter	15 44.9
Moon's equa. hor. parallax	58 43.0	Moon's true semidiameter	15 59.2

## TIMES OF THE PHASES.

Greenwich Mean Time.			Washington Mean Time.		
	d	h m		d	h m
Moon enters penumbra	July	22 14 55.5	July	22 9 47.3	
Moon enters shadow		22 15 54.7		22 10 46.5	
Total eclipse begins		22 16 53.6		22 11 45.4	
Middle of the eclipse		22 17 44.8		22 12 36.6	
Total eclipse ends		22 18 36.0		22 13 27.8	
Moon leaves shadow		22 19 34.8		22 14 26.6	
Moon leaves penumbra		22 20 33.9		22 15 25.7	

## CIRCUMSTANCES OF THE ECLIPSE.

Contacts of Shadow with moon's limb.	Angles of position from north point.	The moon being in the zenith in longitude from Greenwich and latitude.	
First	82° to E.	61° 16.2' W.	20° 9.6' S.
Last	96 to W.	114 12.3 W.	19 53.4 S.

Magnitude of the eclipse = 1.525, (moon's diameter = 1).

V.—A Partial Eclipse of the Sun, 1888, August 7, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, August 7				<sup>d</sup> 5	<sup>h</sup> 32	<sup>m</sup> 35.0		
Sun and moon's R. A.	<sup>h</sup> 9	<sup>m</sup> 12	<sup>s</sup> 7.04	Hourly motions		<sup>s</sup> 9.54 and 143.13		
Sun's declination	16°	10'	47".4 N.	Hourly motion		' 42.6	S.	
Moon's declination	17°	34'	34.7 N.	Hourly motion		6 59.3	S.	
Sun's equa. hor. parallax	8.7			Sun's true semidiameter		15 46.7		
Moon's equa. hor. parallax	57 13.1			Moon's true semidiameter		15 34.7		

CIRCUMSTANCES OF THE ECLIPSE.

Eclipse begins	August	<sup>d</sup> 7	<sup>h</sup> 5	<sup>m</sup> 2.4	in long. 157° 39'.6 E. and in lat. 71° 7'.6 N.	
Greatest eclipse		7	6	5.8	53 11.2 E.	70 6.8 N.
Eclipse ends		7	7	9.4	6 52.3 E.	53 17.8 N.

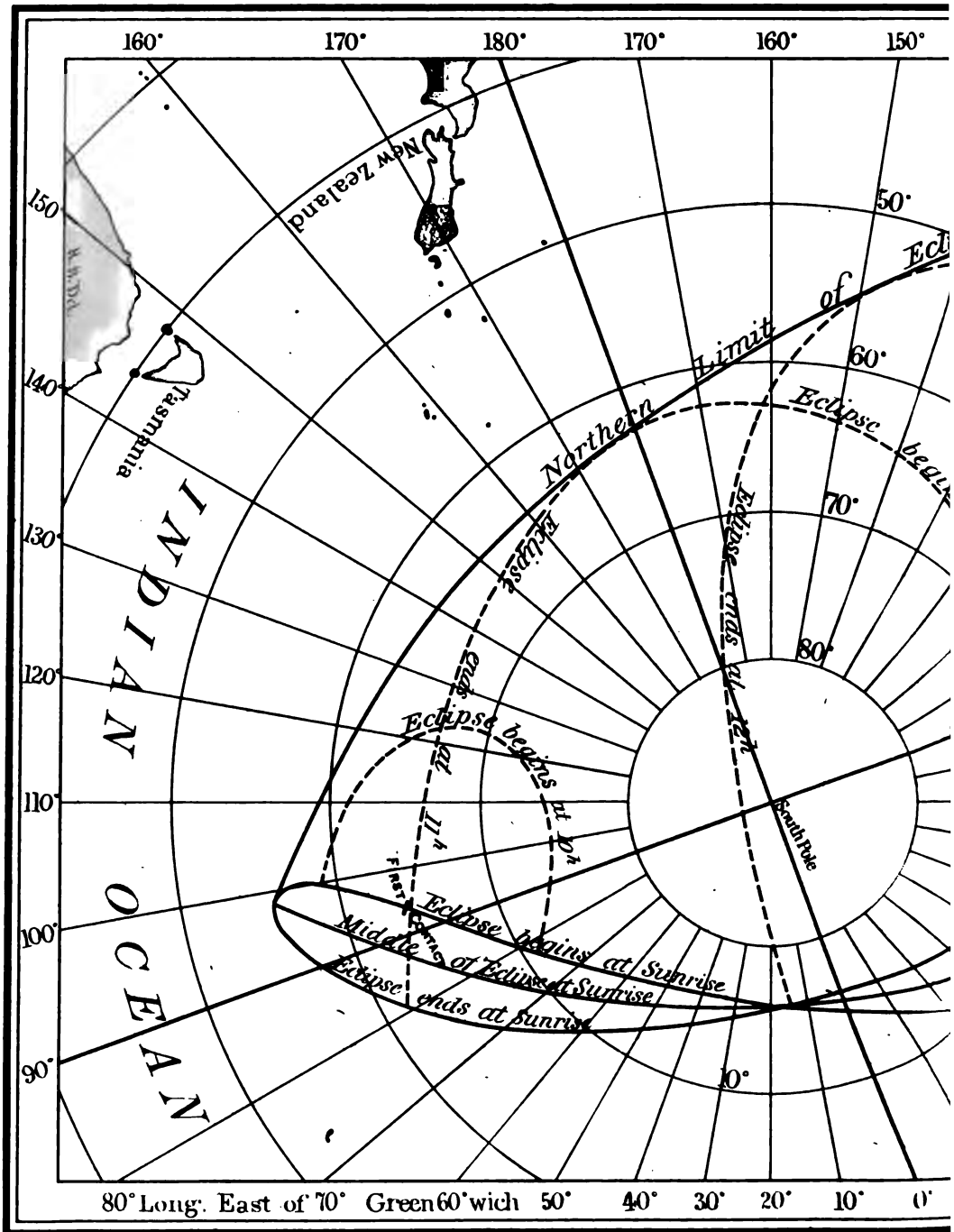
Magnitude of greatest eclipse = 0.198, (sun's diameter = 1).

No chart of this eclipse is given, but the regions within which it is visible are chiefly the Arctic Ocean, Norway and Sweden, portions of Denmark and Greenland, and the extreme northerly parts of North America and Asia.

The regions within which the first two eclipses of the sun are visible, are laid down on the accompanying charts, from which, by means of the dotted lines, the Greenwich time of beginning or ending within fifteen or twenty minutes, may also be found.

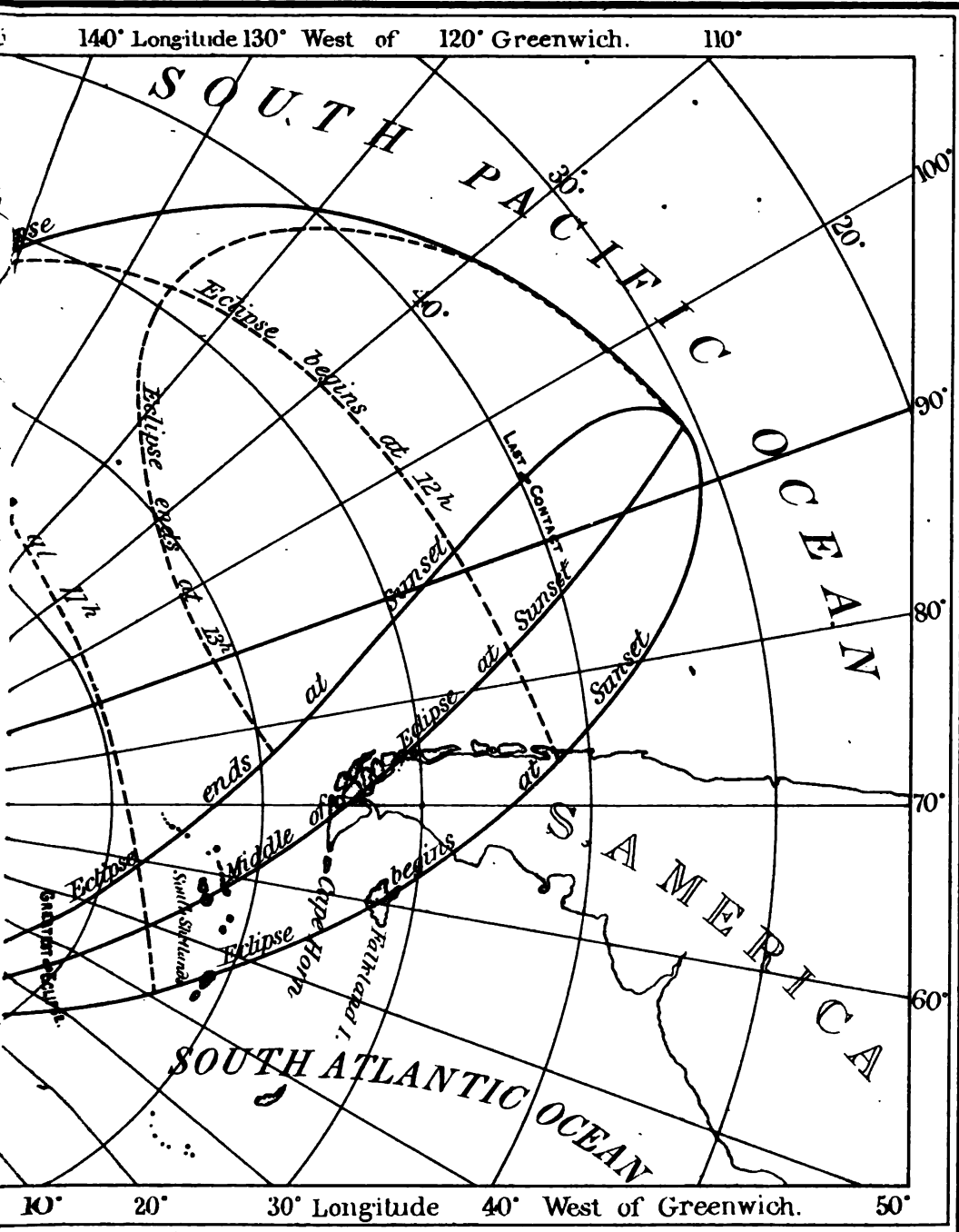


# PARTIAL ECLIPSE OF



Note.—The hours of beginning and end

**FEBRUARY 11<sup>TH</sup> 1888.**



*are expressed in Greenwich Mean Time.*



BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE  
OF THE SUN, 1888, FEBRUARY 11.

Greenwich Mean Time.	Co-ordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	$\mu$	<i>l</i>
<sup>h</sup> <sup>m</sup> 9 50	-0.63246	-1.45504	-9.38257	+9.98697	143° 52.7	+0.56175
10 0	-0.54682	-1.43468	-9.38251	+9.98698	146 22.7	+0.56177
10 10	0.46117	1.41431	9.38244	9.98698	148 52.7	0.56180
20	0.37553	1.39393	9.38237	9.98698	151 22.7	0.56182
30	0.28989	1.37355	9.38230	9.98699	153 52.8	0.56184
40	0.20425	1.35316	9.38223	9.98699	156 22.8	0.56186
50	0.11861	1.33277	9.38216	9.98700	158 52.8	0.56188
11 0	-0.03297	-1.31237	-9.38210	+9.98700	161 22.8	+0.56190
10 10	+0.05267	1.29196	9.38203	9.98701	163 52.8	0.56192
20	0.13831	1.27154	9.38196	9.98701	166 22.8	0.56194
30	0.22395	1.25112	9.38189	9.98701	168 52.8	0.56196
40	0.30958	1.23069	9.38182	9.98702	171 22.8	0.56198
50	0.39521	1.21025	9.38175	9.98702	173 52.9	0.56200
12 0	+0.48084	-1.18980	-9.38169	+9.98703	176 22.9	+0.56201
10 10	0.56646	1.16934	9.38162	9.98703	178 52.9	0.56203
20	0.65208	1.14887	9.38155	9.98704	181 22.9	0.56205
30	0.73769	1.12840	9.38148	9.98704	183 52.9	0.56207
40	0.82330	1.10792	9.38141	9.98704	186 22.9	0.56209
50	0.90891	1.08744	9.38134	9.98705	188 52.9	0.56210
13 0	+0.99452	-1.06695	-9.38128	+9.98705	191 22.9	+0.56211
10 10	1.08012	1.04645	9.38121	9.98706	193 53.0	0.56213
20	1.16571	1.02594	9.38114	9.98706	196 23.0	0.56214
30	+1.25130	-1.00543	-9.38107	+9.98706	198 53.0	+0.56215

Greenwich Mean Time.	Log $\Delta x$ for 1 Minute.	Log $\Delta y$ for 1 Minute.	Log $\Delta \mu$ for 1 Minute.	Log Tangent of Angle of Cone—
				Penumbra.
<sup>h</sup> 9	+7.9327	+7.3076	+1.1761	+7.67544
10	7.9327	7.3088	1.1761	7.67544
11	7.9327	7.3098	1.1761	7.67544
12	7.9326	7.3107	1.1761	7.67543
13	7.9325	7.3117	1.1761	7.67543
14	+7.9323	+7.3126	+1.1761	+7.67543

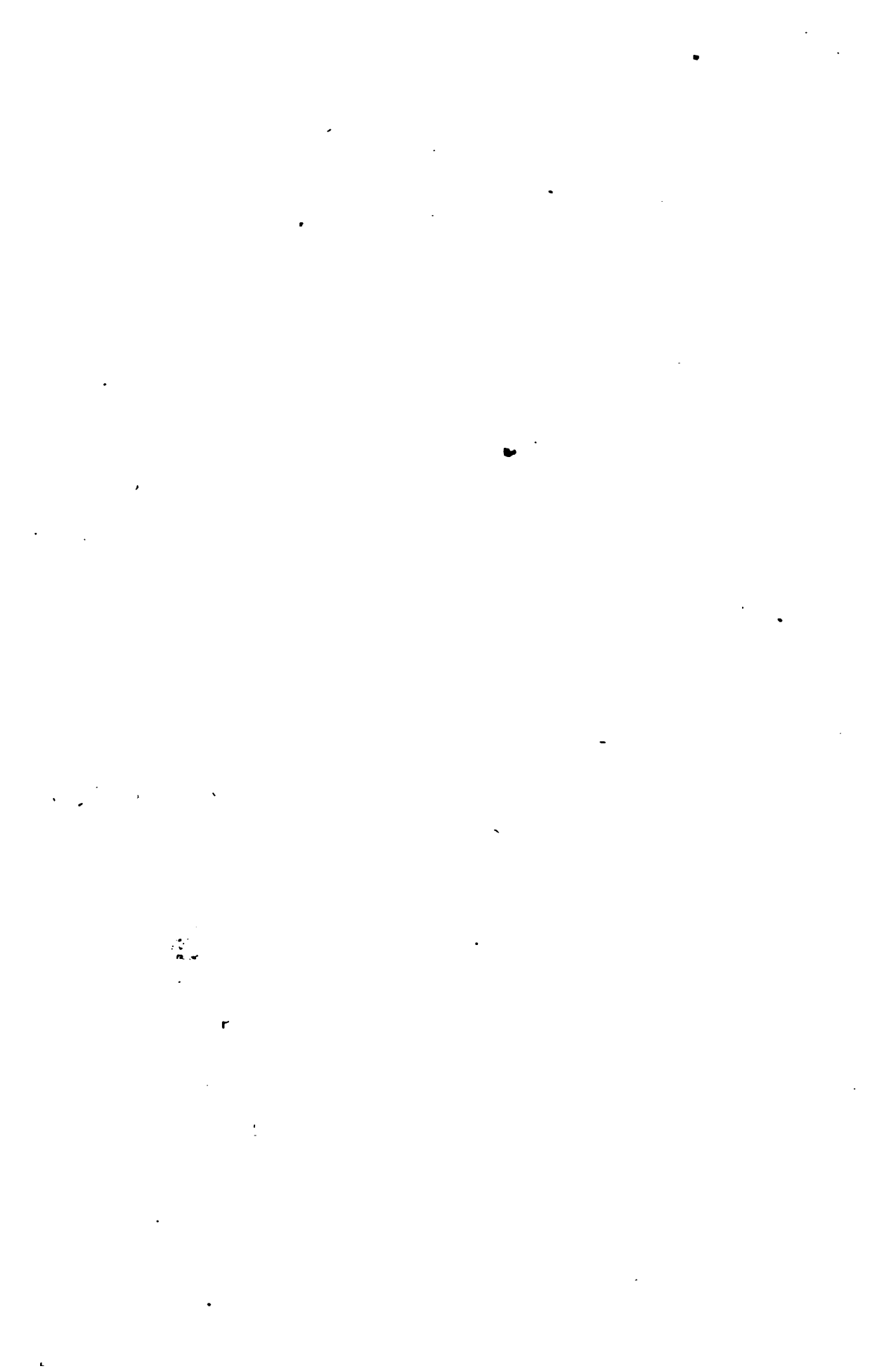


**BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE  
OF THE SUN, 1888, JULY 8.**

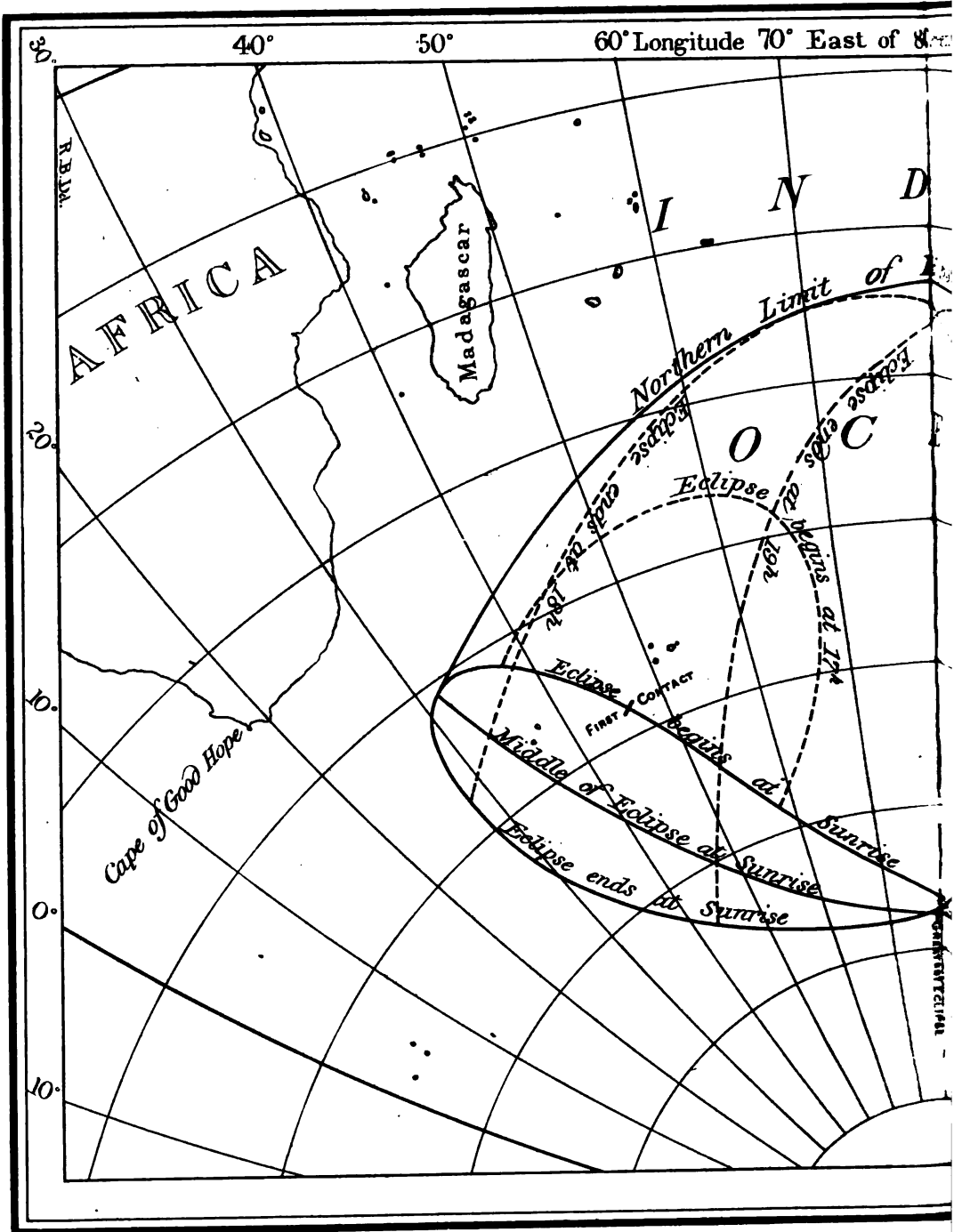
Greenwich Mean Time.	Co-ordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radins of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	$\mu$	<i>l</i>
<sup>h</sup> <sup>m</sup> 16 50	-0.92207	-1.25198	+9.57971	+9.96615	251° 15.5	+0.55618
17 0	-0.83469	-1.25467	+9.57970	+9.96615	253 45.5	+0.55617
10	0.74731	1.25736	9.57969	9.96615	256 15.5	0.55616
20	0.65992	1.26006	9.57967	9.96615	258 45.5	0.55615
30	0.57253	1.26277	9.57965	9.96616	261 15.5	0.55614
40	0.48514	1.26548	9.57964	9.96616	263 45.5	0.55612
50	0.39775	1.26820	9.57962	9.96616	266 15.5	0.55610
18 0	-0.31036	-1.27092	+9.57960	+9.96617	268 45.5	+0.55608
10	0.22296	1.27365	9.57959	9.96617	271 15.5	0.55607
20	0.13556	1.27638	9.57957	9.96617	273 45.5	0.55606
30	-0.04816	1.27911	9.57956	9.96617	276 15.5	0.55604
40	+0.03924	1.28185	9.57954	9.96618	278 45.5	0.55602
50	0.12664	1.28460	9.57953	9.96618	281 15.5	0.55600
19 0	+0.21405	-1.28735	+9.57951	+9.96618	283 45.5	+0.55598
10	0.30146	1.29011	9.57950	9.96618	286 15.5	0.55596
20	0.38887	1.29288	9.57948	9.96619	288 45.5	0.55594
30	0.47627	1.29565	9.57947	9.96619	291 15.5	0.55592
40	0.56367	1.29842	9.57945	9.96619	293 45.5	0.55590
50	0.65107	1.30120	9.57944	9.96620	296 15.5	0.55588
20 0	+0.73847	-1.30398	+9.57942	+9.96620	298 45.5	+0.55586
10	0.82587	1.30677	9.57941	9.96620	301 15.5	0.55584
20	+0.91327	-1.30956	+9.57939	+9.96620	303 45.5	+0.55582



Greenwich Mean Time.	Log $\Delta x$ for 1 Minute.	Log $\Delta y$ for 1 Minute.	Log $\Delta \mu$ for 1 Minute.	Log Tangent of Angle of Cone—
				Penumbra.
<sup>h</sup> 15	+7.9414	-6.4246	+1.1761	+7.66271
16	7.9414	6.4302	1.1761	7.66271
17	7.9415	6.4352	1.1761	7.66271
18	7.9415	6.4401	1.1761	7.66271
19	7.9415	6.4449	1.1761	7.66271
20	+7.9415	-6.4490	+1.1761	+7.66271

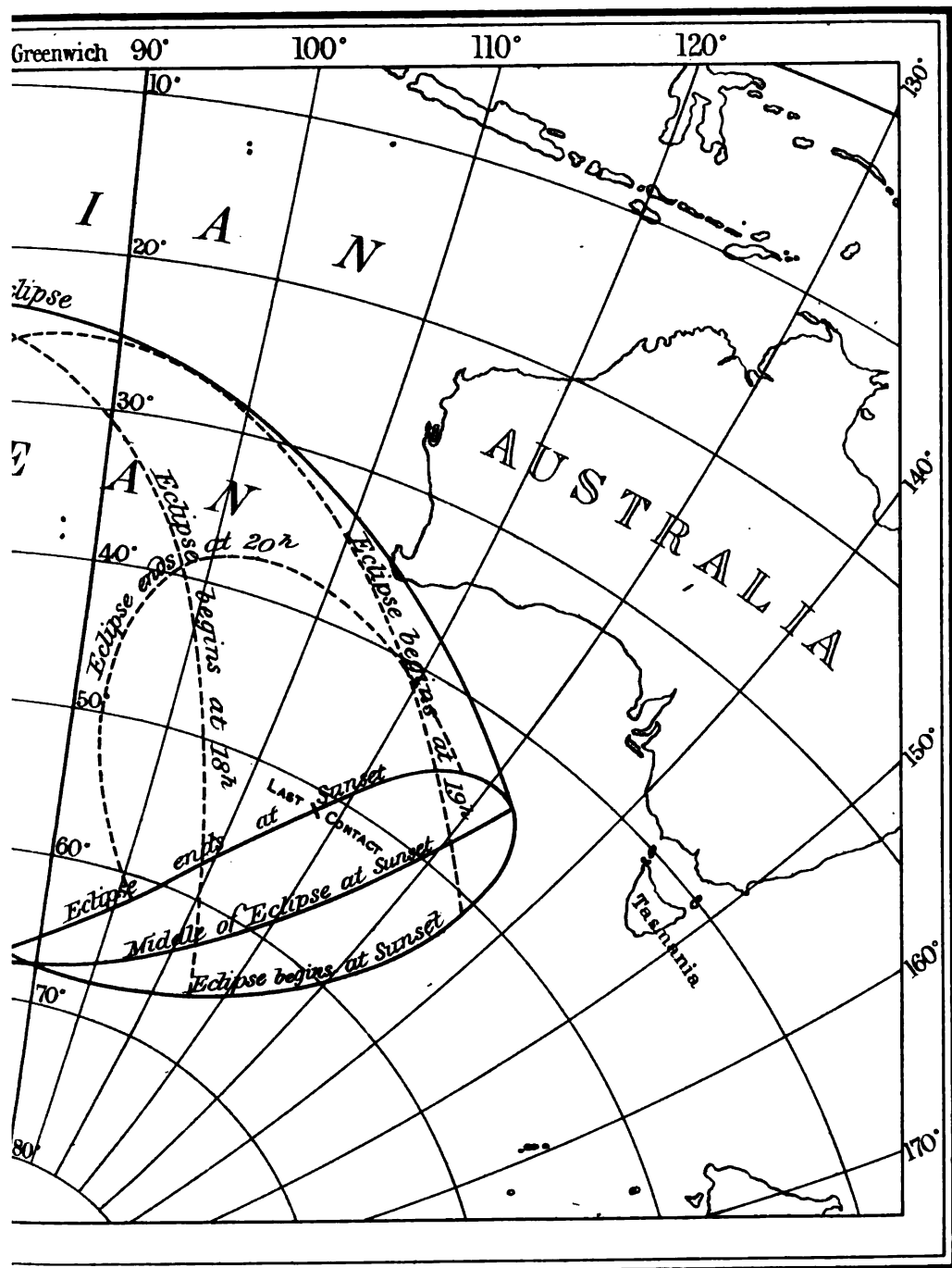


# PARTIAL ECLIPSE OF



Note.-The hours of beginning and ending

OF JULY 8<sup>TH</sup> 1888.



are expressed in Greenwich Mean Time.



BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE  
OF THE SUN, 1888, AUGUST 7.

Greenwich Mean Time.	Coordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	
h m						
5 0	-0.28748	+1.52785	+9.11511	+9.98244	73 38.3	+0.54938
10	0.19915	1.50944	9.11508	9.98245	76 8.3	0.54937
20	0.11082	1.49102	9.11503	9.98245	78 38.1	0.54936
30	-0.02249	1.47259	9.11498	9.98245	81 8.1	0.54934
40	+0.06583	1.45415	9.11493	9.98246	83 38.1	0.54932
50	0.15416	1.43571	9.11488	9.98246	86 8.1	0.54930
6 0	+0.24248	+1.41726	+9.11483	+9.98247	88 38.5	+0.54928
10	0.33080	1.39880	9.11478	9.98247	91 8.5	0.54926
20	0.41912	1.38033	9.11473	9.98248	93 38.5	0.54924
30	0.50744	1.36185	9.11468	9.98248	96 8.5	0.54922
40	0.59576	1.34336	9.11463	9.98248	98 38.6	0.54920
50	0.68408	1.32486	9.11458	9.98249	101 8.6	0.54918
7 0	+0.77240	+1.30634	+9.11453	+9.98249	103 38.6	+0.54916
10	+0.86071	+1.28781	+9.11448	+9.98250	106 8.6	+0.54914

Greenwich Mean Time.	Log Δ <i>x</i> for 1 Minute.	Log Δ <i>y</i> for 1 Minute.	Log Δ <i>μ</i> for 1 Minute.	Log Tangent of Angle of Cone
				Penumbra.
h				
5	+7.9461	-7.2649	+1.1762	+7.66394
6	7.9461	7.2662	1.1762	7.66394
7	+7.9460	-7.2676	+1.1762	+7.66395

## WASHINGTON MEAN TIME.

## PHASES OF THE MOON.

New Moon.				First Quarter.				Full Moon.				Last Quarter.			
	d	h	m		d	h	m		d	h	m		d	h	m
January	12	15	30.4	January	20	11	40.9	January	28	6	10.7	January	5	18	34.2
February	11	6	44.2	February	19	8	51.0	February	26	18	49.4	February	4	2	17.5
March	11	23	12.8	March	20	3	35.2	March	27	4	59.3	March	4	10	17.7
April	10	15	59.5	April	18	18	44.2	April	25	13	14.0	April	2	19	33.0
May	10	8	15.3	May	18	5	57.0	May	24	20	31.9	May	2	6	38.9
June	8	23	25.8	June	16	13	41.5	June	23	3	59.3	June	31	19	45.1
July	8	13	8.4	July	15	19	4.6	July	22	12	36.9	June	30	10	44.4
August	7	1	12.7	August	13	23	35.8	August	20	23	12.1	July	30	3	21.4
September	5	11	47.9	September	12	4	51.7	September	19	12	16.1	August	28	21	9.7
October	4	21	26.0	October	11	12	20.8	October	19	4	0.8	September	27	15	22.0
November	3	6	51.2	November	9	23	7.5	November	17	22	7.7	October	27	8	47.5
December	2	16	57.4	December	9	13	37.6	December	17	17	32.6	November	26	0	12.2
												December	25	12	51.7

## PERIGEE, APOGEE, AND GREATEST LIBRATION.

Perigee.		Apogee.		Greatest Libration.			
	d h		d h		d h m		d h m
January	7 19.6	January	20 7.8	January	14 5 29 W.	January	26 2 58 E.
February	1 12.3	February	17 4.2	February	9 19 44 W.	February	23 5 23 E.
February	28 23.3	March	15 21.1	March	7 1 58 W.	March	22 8 47 E.
March	28 5.4	April	12 5.7	April	3 14 47 W.	April	19 14 35 E.
April	25 15.7	May	9 8.1	May	1 17 44 W.	May	17 17 38 E.
May	24 1.6	June	5 16.2	May	29 23 24 W.	June	14 10 32 E.
June	21 7.1	July	3 5.3	June	27 2 27 W.	July	11 2 24 E.
July	18 24.0	July	31 0.9	July	24 22 46 W.	August	6 13 10 E.
August	13 18.9	August	27 19.6	August	21 5 22 W.	September	2 21 9 E.
September	8 18.0	September	24 14.0	September	16 14 3 W.	October	0 18 48 E.
October	6 13.8	October	22 5.1	October	13 7 45 W.	October	29 0 6 E.
November	3 21.8	November	18 10.9	November	10 3 2 W.	November	26 7 34 E.
December	2 10.4	December	15 12.1	December	8 9 19 W.	December	24 3 48 E.
December	30 22.2						

## FORMULÆ FOR THE LIBRATION OF THE MOON.

Put  $I$ , the inclination of the moon's equator to the ecliptic ( $= 1^\circ 28'.8$ ),

$\Omega$ , the mean longitude of the moon's ascending node, (see page 278), or the mean longitude of the descending node of the moon's equator,

$C$ , the angle at the centre of the moon's disk made by a lunar meridian with the circle of declination, counted from north to east on the apparent disk,

$\lambda, \beta, \alpha', \delta'$ , the apparent longitude, latitude, right ascension, and declination of the moon, corrected for parallax,

$\lambda'$ , the selenocentric longitude of the earth, counted on the moon's equator from its descending node,  $\Omega$ ,

$i, \Delta, \Omega', \zeta$ , the quantities defined on page 276, where their values for the year are given.

The moon's libration in longitude and latitude may then be found, for any time, by means of the following formulæ, in connection with the tables given on pages 276 and 277:—

$$\left. \begin{aligned} \Delta \lambda &= -0'.57 \sin 2(\Omega - \lambda) \\ a &= \sin I \cos(\Omega - \lambda) \\ \tan B &= \tan I \sin(\Omega - \lambda) \\ \lambda' &= \lambda + \Delta \lambda + a b \end{aligned} \right\} \text{See table, page 277.}$$

$$\text{The libration in latitude} = b = B - \beta$$

$$\text{The libration in longitude} = l = \lambda' - \zeta$$

$$\sin C = \sin i \frac{\cos(\lambda' + \Delta - \Omega)}{\cos \delta'} = -\sin i \frac{\cos(\alpha' - \Omega')}{\cos \beta}$$

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1885.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	x	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
7 Leonis	6½	+0.14	-5.3	+14 52.7	1 17 54.6	+ 3 10.9	+0.9137	0.5712	-0.1345	+90	+24
♂ Leonis	6	0.11	5.1	14 31.9	21 29.7	+ 6 29.8	+0.8017	0.5716	0.1399	+90	+16
α Leonis	1½	+0.03	4.1	12 30.8	2 8 12.2	- 7 1.8	+1.2750	0.5685	0.1557	+90	+56
34 Leonis	6½	0.00	4.4	13 54.4	9 37.0	- 5 39.9	-0.3832	0.5682	0.1579	+15	-53
l Leonis	5½	-0.15	3.0	11 8.3	3 2 22.6	+10 30.6	-0.3532	0.5632	0.1778	+17	-54
B. A. C. 3837	6½	-0.24	-1.7	+ 8 40.4	13 31.4	- 2 43.5	+0.1314	0.5615	-0.1886	+44	-27
ν Virginis	4	0.39	-0.4	7 9.4	4 3 56.5	+11 12.0	-1.1140	0.5594	0.1991	-30	-83
♂ Virginis	5½	0.43	+1.0	4 16.7	10 21.1	- 6 36.4	+0.5331	0.5586	0.2022	+71	-7
c Virginis	5½	0.53	1.6	2 56.2	19 39.4	+ 2 22.9	-1.0170	0.5576	0.2058	-22	-86
B. A. C. 4251	6	0.62	2.6	+ 2 28.4	5 3 51.2	+10 18.1	-1.2240	0.5576	0.2077	-41	-88
80 Virginis	6	-0.89	+6.3	- 4 49.4	6 5 42.7	+11 16.8	+0.8124	0.5616	-0.2952	+85	+9
88 Virginis	6½	0.94	6.9	6 16.6	11 26.3	-7 11.3	+1.1150	0.5622	0.2026	+84	+30
ξ¹ Libræ	6	1.28	9.0	11 26.4	7 16 32.4	- 3 6.4	+0.7214	0.5707	0.1803	+79	+4
ξ² Libræ	5½	1.30	8.9	10 57.4	17 34.7	- 2 6.3	+0.6438	0.5711	0.1793	+35	-34
17 Libræ	7	1.31	8.8	10 42.1	18 13.8	- 1 28.6	-0.3299	0.5711	0.1786	+15	-56
18 Libræ	6½	-1.31	+8.8	-10 41.6	18 30.4	- 1 12.5	-0.3872	0.5715	-0.1782	+12	-60
B. A. C. 5070	6	1.43	9.1	11 57.9	8 5 13.3	+ 9 7.2	-0.9195	0.5767	0.1658	-23	-90
γ Libræ	4½	1.50	9.7	14 24.7	10 8.3	-10 8.6	+0.7285	0.5786	0.1591	+76	+5
η Libræ	6	1.56	9.8	15 18.7	13 44.7	- 6 40.1	+1.0760	0.5798	0.1538	+75	+29
48 Libræ	5½	1.61	9.3	13 57.1	19 42.1	- 0 55.8	-1.1890	0.5821	0.1447	-46	-90
49 Libræ	6	-1.64	+9.8	-16 12.0	20 35.6	- 0 4.3	+0.9561	0.5825	-0.1433	+74	+29
♂ Ophiuchi	4½	1.78	9.1	16 21.9	9 9 21.2	-11 47.3	-0.5693	0.5870	0.1212	-5	-76
♂ Scorpii	5½	1.83	9.0	17 31.4	13 37.4	- 7 40.7	+0.1047	0.5879	0.1137	+31	-30
29 Ophiuchi	6½	1.92	8.6	18 43.1	21 53.7	+ 0 16.7	+0.4417	0.5909	0.0976	+59	-11
B. A. C. 6060	6	2.11	6.6	18 46.7	10 19 46.8	- 2 40.6	-1.1380	0.5946	0.0513	-50	-90
μ Sagittarii	4	-2.17	+6.0	-21 5.2	11 2 56.1	+ 4 12.1	+0.9080	0.5946	-0.0358	+69	+18
NEW MOON.											
θ Capricorni	4	2.09	-3.8	17 40.7	14 2 56.2	+ 1 31.4	+0.3568	0.5678	+0.1112	+46	-16
31 Capricorni	6½	2.06	4.5	17 56.0	8 26.3	+ 6 50.1	+1.2610	0.5635	0.1198	+72	+53
ι Capricorni	4½	-2.04	-4.7	-17 18.8	10 14.6	+ 8 34.7	+0.8256	0.5623	+0.1220	+73	+11
42 Capricorni	5½	1.95	5.4	14 32.9	19 5.4	- 6 52.5	-0.9698	0.5569	0.1345	-28	-90
44 Capricorni	6	1.95	5.6	14 51.8	19 46.9	- 6 12.4	-0.4886	0.5564	0.1354	+2	-69
45 Capricorni	6½	1.95	5.7	15 15.8	20 12.8	- 5 47.4	-0.6566	0.5564	0.1359	+25	-40
μ Capricorni	5	1.90	6.0	14 4.8	15 0 30.7	- 1 38.0	-0.7199	0.5527	0.1415	-10	-90
ι Aquarii	4½	-1.85	-6.8	-14 24.9	6 41.8	+ 4 20.9	+0.5338	0.5488	+0.1488	+63	-7
42 Aquarii	5½	1.82	7.1	13 23.4	11 38.3	+ 9 7.8	+0.1875	0.5465	0.1545	+12	-26
45 Aquarii	6½	1.82	7.3	13 52.0	12 41.3	+10 8.8	+0.8626	0.5455	0.1553	+76	+13
B. A. C. 7835	6½	1.76	7.7	13 29.5	17 59.8	- 8 42.9	+1.3010	0.5429	0.1607	+77	+56
σ Aquarii	5	1.73	7.3	11 15.2	18 19.6	- 8 23.7	-1.0510	0.5429	0.1611	-30	-90
58 Aquarii	6½	-1.73	-7.5	-11 28.8	18 49.6	- 7 54.7	-0.7259	0.5421	+0.1617	-8	-90
70 Aquarii	6	1.66	8.1	11 8.9	16 3 4.2	+ 0 4.4	+0.2788	0.5373	0.1688	+49	-21
Lalande 44734	6½	1.64	8.2	10 39.4	5 9.5	+ 2 5.9	+0.1026	0.5356	0.1705	+39	-31
ψ¹ Aquarii	4	1.52	8.9	9 41.9	16 46.4	-10 38.5	+1.0920	0.5296	0.1781	+81	+29
ι Aquarii	5½	1.50	8.8	8 20.3	17 16.9	-10 9.0	-0.2930	0.5295	0.1782	+18	-54
B. A. C. 8274	7	-1.33	-9.4	-7 0.3	17 9 36.0	+ 5 41.0	+1.2430	0.5226	+0.1864	+83	+43
27 Piscium	5	1.26	8.9	4 10.8	14 54.2	+10 50.0	-0.8559	0.5207	0.1881	-12	-90
29 Piscium	5	1.24	8.8	3 39.2	16 33.4	-11 33.7	-1.1180	0.5199	0.1886	-31	-90
4 Ceti	6	1.20	8.8	3 10.5	19 39.8	- 8 32.7	-1.0580	0.5183	0.1890	-26	-90
5 Ceti	6	1.20	8.8	3 4.5	19 54.7	- 8 18.3	-1.1410	0.5183	0.1896	-33	-90
14 Ceti	6	-1.04	-9.1	-1 7.5	18 10 25.6	+ 5 48.7	-0.5218	0.5151	+0.1916	+8	-70
15 Ceti	6½	1.04	9.1	-1 7.5	11 47.4	+ 7 7.1	-0.2336	0.5146	0.1916	+23	-50
26 Ceti	6	0.88	9.0	+ 0 45.9	19 1 35.5	- 3 28.2	+0.3205	0.5131	0.1912	+55	-19
29 Ceti	6½	0.86	8.9	1 24.4	3 49.2	- 1 18.2	+0.0350	0.5128	0.1908	+38	-34
33 Ceti	6	0.84	8.8	1 50.9	5 13.4	+ 0 3.6	-0.1869	0.5127	0.1904	+26	-47
35 Ceti	6½	-0.83	-8.8	+ 1 52.7	6 17.1	+ 1 5.5	-0.0147	0.5122	+0.1904	+35	-37
f Piscium	5	-0.80	-8.5	+ 3 1.4	9 7.2	+ 3 50.8	-0.7404	0.5121	+0.1897	-5	-87



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination	Washington Mean Time.	Hour Angle H	$\gamma$	$z'$	$y'$	N.	S.	
		$\Delta\alpha$	$\Delta\delta$	d h m	h m						
$\nu$ Piscium	4 $\frac{1}{2}$	-0.66	-8.4	+ 4 55.1	19 21 49.6	- 7 48.3	-0.4466	0.5130	+0.1864	+12	-64
64 Ceti	5 $\frac{1}{2}$	0.49	7.8	8 2.6	20 13 49.2	+ 7 44.1	-0.9779	0.5150	0.1796	-20	-82
$\xi$ Ceti	4 $\frac{1}{2}$	0.48	7.8	8 19.2	14 41.2	+ 8 34.6	-1.1290	0.5154	0.1791	-32	-82
$\xi$ Ceti	4 $\frac{1}{2}$	0.41	8.1	7 57.4	22 43.6	- 7 36.8	+0.6937	0.5172	0.1746	+29	+ 4
B. A. C. 830	6	0.32	7.5	10 15.7	21 6 14.2	- 0 19.3	-0.5618	0.5189	0.1694	+ 6	-69
$\mu$ Ceti	4 $\frac{1}{2}$	-0.32	-7.7	+ 9 38.3	7 30.6	+ 0 55.0	+0.3389	0.5196	+0.1634	+57	-15
Lalande 5725	6	0.19	6.9	12 45.4	18 36.6	+11 41.5	-1.2770	0.5235	0.1598	-51	-77
$f$ Tauri	4	-0.07	7.2	12 33.0	22 7 6.5	- 0 11.1	+0.8756	0.5284	0.1483	+30	+18
48 Tauri	6	+0.14	6.9	15 7.1	23 5 17.1	- 2 41.5	+1.0690	0.5405	0.1231	+30	+36
$\gamma$ Tauri	4	0.16	6.9	15 21.3	7 13.6	- 0 48.7	+1.0460	0.5409	0.1202	+30	+34
$\delta$ Tauri	4	+0.18	-6.4	+17 16.7	8 42.2	+ 0 37.0	-0.8782	0.5421	+0.1182	-15	-73
63 Tauri	6	0.18	6.6	16 30.7	8 57.1	+ 0 51.5	-0.0109	0.5424	0.1180	+35	-28
$\delta$ Tauri	5 $\frac{1}{2}$	0.18	6.4	17 10.9	9 15.8	+ 1 9.6	-0.7055	0.5425	0.1179	- 4	-72
$\delta$ Tauri	5	0.19	6.3	17 40.1	9 55.4	+ 1 47.9	-1.1580	0.5433	0.1168	-38	-72
70 Tauri	6 $\frac{1}{2}$	0.18	6.8	15 40.9	10 1.6	+ 1 53.9	+1.0220	0.5433	0.1166	+90	+33
75 Tauri	6 $\frac{1}{2}$	+0.20	-6.8	+16 6.4	11 22.7	+ 3 12.5	+0.7127	0.5441	+0.1146	+30	+13
$\theta$ Tauri	4	0.19	6.8	15 42.7	11 26.7	+ 3 16.3	+1.1520	0.5444	0.1146	+30	+45
$\theta$ Tauri	4	0.19	6.9	15 37.2	11 29.3	+ 3 18.8	+1.2569	0.5444	0.1146	+30	+58
B. A. C. 1391	5	0.20	6.8	15 56.9	12 23.4	+ 4 11.2	+0.9982	0.5444	0.1129	+30	+32
$\alpha$ Tauri	1	0.22	6.8	16 16.9	14 56.6	+ 6 39.5	+0.9220	0.5458	0.1098	+30	+27
B. A. C. 1468	6 $\frac{1}{2}$	+0.28	-6.4	+18 31.7	19 48.2	+11 21.7	-1.0060	0.5486	+0.1027	-25	-71
$i$ Tauri	5 $\frac{1}{2}$	0.30	6.4	18 38.8	22 11.9	-10 19.4	-0.8896	0.5492	0.0993	-16	-71
B. A. C. 1526	5 $\frac{1}{2}$	0.32	6.9	16 58.5	24 1 2.8	- 7 34.1	+1.1950	0.5505	0.0948	+30	+52
$m$ Tauri	5 $\frac{1}{2}$	0.36	6.6	18 29.5	5 39.8	- 3 6.2	-0.0270	0.5537	0.0873	+35	-25
119 Tauri	5	0.46	6.8	18 30.4	17 1.8	+ 7 52.9	+0.8424	0.5601	0.0684	+30	+26
120 Tauri	6	+0.47	-6.8	+18 27.5	17 37.6	+ 8 27.4	+0.9340	0.5607	+0.0672	+30	+32
127 Tauri	6 $\frac{1}{2}$	0.50	6.9	18 55.4	21 50.2	-11 28.7	+0.7013	0.5627	0.0599	+30	+18
$\chi$ Orionis	4 $\frac{1}{2}$	0.53	6.6	20 15.1	25 2 57.4	- 6 32.0	-0.4385	0.5645	0.0506	+12	-46
$\chi$ Orionis	6	0.53	6.7	19 43.4	3 12.5	- 6 17.5	+0.1390	0.5646	0.0505	+45	-12
$\chi$ Orionis	6	0.56	6.9	19 41.4	6 59.1	- 2 38.8	+0.3487	0.5666	0.0431	+58	0
$\chi$ Orionis	5	+0.56	-6.8	+20 8.3	7 10.8	- 2 27.5	-0.1210	0.5669	+0.0429	+21	-26
68 Orionis	6	0.58	6.9	19 48.8	10 45.7	+ 0 59.9	+0.3659	0.5686	0.0358	+60	+ 2
71 Orionis	6	0.59	7.1	19 11.5	12 1.5	+ 2 13.0	+1.0720	0.5694	0.0336	+30	+46
15 Geminorum	6 $\frac{1}{2}$	0.62	6.8	20 51.4	17 38.2	+ 7 37.8	-0.5451	0.5716	0.0221	+ 5	-52
16 Geminorum	6 $\frac{1}{2}$	0.62	7.0	20 33.7	17 43.1	+ 7 42.5	-0.2300	0.5716	0.0221	+23	-30
$\nu$ Geminorum	4 $\frac{1}{2}$	+0.63	-6.9	+20 16.8	18 9.9	+ 8 8.4	+0.0797	0.5719	+0.0214	+41	-12
$\zeta$ Geminor. <i>mult.</i>	4	0.69	7.1	20 43.9	26 9 19.1	- 1 15.1	-0.3147	0.5781	-0.0093	+18	-34
56 Geminorum	5 $\frac{1}{2}$	0.72	7.3	20 39.2	16 55.7	+ 6 4.9	-0.3548	0.5789	0.0251	+16	-38
61 Geminorum	6	0.72	7.4	20 28.7	19 2.9	+ 8 7.5	-0.2290	0.5801	0.0295	+23	-31
79 Geminorum	6 $\frac{1}{2}$	0.74	7.4	20 35.0	27 2 45.8	- 8 26.7	-0.6262	0.5808	0.0457	+ 1	-60
$g$ Geminorum	5 $\frac{1}{2}$	+0.74	-7.6	+18 46.9	3 12.8	- 8 0.6	+1.2310	0.5809	-0.0464	+30	+62
85 Geminorum	6	0.74	7.5	20 10.6	7 12.7	- 4 9.6	-0.4253	0.5817	0.0547	+12	-46
$d$ Cancri	6	0.74	7.7	18 41.4	18 54.8	+ 7 6.6	+0.3352	0.5828	0.0787	+57	- 4
SATURN				20 4.2	20 20.0	+ 8 28.7	-1.2070	0.5916	0.0838	-46	-70
$\theta$ Cancri	5 $\frac{1}{2}$	0.74	7.7	18 28.2	22 23.1	+10 27.2	+0.2776	0.5826	0.0862	+53	- 8
$\delta$ Cancri	4	+0.74	-7.7	+18 33.8	28 3 53.9	- 8 14.1	-0.3219	0.5826	-0.0966	+18	-42
7 Leonis	6 $\frac{1}{2}$	0.71	7.5	14 52.7	29 1 37.2	-11 18.8	+0.9286	0.5804	0.1362	+30	+25
$\psi$ Leonis	6	0.70	7.3	14 31.9	4 57.9	- 8 5.3	+0.8177	0.5793	0.1413	+30	+17
34 Leonis	6 $\frac{1}{2}$	0.65	7.1	13 54.4	16 55.4	+ 3 26.1	-0.3480	0.5765	0.1596	+17	-51
37 Leonis	5 $\frac{1}{2}$	0.63	7.1	14 17.1	19 5.6	+ 5 31.6	-1.0800	0.5755	0.1624	-29	-76
$l$ Leonis	5 $\frac{1}{2}$	+0.56	-6.4	+11 8.2	30 9 14.2	- 4 50.2	-0.3091	0.5719	-0.1799	+19	-51
B. A. C. 3837	6 $\frac{1}{2}$	0.50	5.5	8 40.3	20 5.3	+ 5 37.9	+0.1738	0.5696	0.1908	+46	-24
$\nu$ Virginis	4	0.39	4.6	7 9.3	31 10 9.0	- 4 48.0	-1.0550	0.5670	0.2014	-25	-83
$b$ Virginis	5 $\frac{1}{2}$	+0.36	-3.7	+ 4 16.6	16 24.7	+ 1 14.6	+0.5790	0.5662	-0.2051	+75	- 4

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$	d h m	h m					
$\epsilon$ Virginis	5½	+0.28	-3.2	+3 56.2	1 1 31.2	+10 2.1	-0.9594	0.5639	-0.2081	-18° -86°
B. A. C. 4254	6	+0.20	-2.4	+2 28.3	9 33.9	-6 11.8	-1.1650	0.5637	0.2098	-34 -88
$\gamma$ Virginis	6	-0.02	+0.9	-4 49.5	2 11 6.1	-5 32.4	+0.8618	0.5637	0.2061	+85 +12
$\delta$ Virginis	6½	0.08	1.5	6 16.7	16 47.6	-0 2.7	+1.1630	0.5639	0.2033	+84 +35
$\zeta$ Libræ	6	0.41	4.6	11 26.5	3 21 55.9	+4 4.5	+0.7651	0.5684	0.1799	+79 +6
$\zeta$ Libræ	5½	-0.43	+4.4	-10 57.4	22 58.8	+5 5.1	+0.0861	0.5710	-0.1787	+37 -31
17 Libræ	7	0.44	4.4	10 42.1	23 38.3	+5 43.3	-0.2872	0.5711	0.1779	+17 -54
18 Libræ	6½	0.45	4.4	10 41.6	23 55.1	+5 59.5	-0.3462	0.5711	0.1775	+14 -57
B. A. C. 5070	6	0.59	4.8	11 58.0	4 10 44.7	-7 34.0	-0.9046	0.5716	0.1645	-20 -90
$\gamma$ Libræ	4½	0.63	5.8	14 24.8	15 43.7	-2 45.8	+0.7729	0.5731	0.1579	+76 +7
$\eta$ Libræ	6	-0.69	+6.0	-15 18.8	19 23.5	+0 46.1	+1.1200	0.5740	-0.1524	+75 +33
48 Libræ	5½	0.77	5.5	13 57.2	5 1 26.8	+6 36.3	-1.1610	0.5759	0.1431	-43 -90
49 Libræ	6	0.78	6.3	16 12.1	2 21.2	+7 28.7	+1.0000	0.5763	0.1421	+74 +23
$\phi$ Ophiuchi	4½	0.96	6.1	16 22.0	15 22.0	-3 59.0	-0.5400	0.5797	0.1198	-4 -74
24 Scorpii	5½	1.02	6.4	17 31.4	19 43.9	+0 13.2	+0.1362	0.5801	0.1123	+34 -29
20 Ophiuchi	6½	-1.13	+6.4	-18 43.1	6 4 11.7	+8 22.2	+0.4741	0.5816	-0.0966	+53 -9
B. A. C. 6760	6	1.10	5.1	18 46.7	7 2 37.9	+5 58.1	-1.1290	0.5853	0.0508	-50 -90
B. A. C. 6798	6	1.44	5.4	20 44.0	5 22.1	+8 36.1	+0.7573	0.5862	0.0455	+69 +8
$\alpha$ Sagittarii	4	1.50	5.1	21 5.2	9 58.4	-10 58.0	+0.9380	0.5864	0.0355	+69 +20
15 Sagittarii	5½	1.51	5.0	20 45.5	10 34.7	-10 22.9	+0.5776	0.5864	0.0339	+55 -3
16 Sagittarii	6½	-1.51	+4.9	-20 25.1	10 35.3	-10 22.5	+0.2258	0.5864	-0.0338	+31 -23
21 Sagittarii	5	1.55	4.7	20 35.9	14 46.8	-6 20.4	+0.2879	0.5863	0.0253	+34 -20
B. A. C. 6736	6	1.69	4.5	21 29.3	19 58.0	-1 20.9	+1.1070	0.5853	0.0140	+69 +35
B. A. C. 6347	6	1.61	4.4	21 8.4	20 23.1	-0 56.7	+0.7425	0.5853	0.0128	+69 +7
20 Sagittarii	5½	1.64	3.8	20 27.0	8 0 52.4	+3 22.5	-0.0104	0.5855	-0.0033	+15 -37
33 Sagittarii	6	-1.67	+3.8	-21 29.7	2 39.3	+5 5.4	+1.0740	0.5857	+0.0003	+69 +32
$\zeta$ Sagittarii	5½	1.67	3.5	20 48.0	4 3.6	+6 26.6	+0.3571	0.5852	0.0033	+36 -16
$\zeta$ Sagittarii	3½	1.68	3.6	21 15.0	4 12.7	+6 35.3	+0.2335	0.5851	0.0038	+69 +12
Lalande 35497	6½	1.68	2.9	19 24.3	6 25.4	+8 45.9	-1.0810	0.5843	0.0087	-49 -90
B. A. C. 6536	5½	1.69	2.7	19 27.9	8 39.1	+10 51.8	-0.9982	0.5843	0.0128	-42 -90
$\pi$ Sagittarii	3	-1.72	+3.0	-21 12.0	9 14.2	+11 25.6	+0.8177	0.5843	+0.0146	+69 +12
B. A. C. 6707	6½	1.77	1.3	19 5.9	20 29.2	-1 44.4	-1.0780	0.5811	0.0384	-40 -90
$\nu$ Sagittarii	5	1.80	0.9	20 1.8	9 0 41.1	+2 18.3	+0.0733	0.5799	0.0470	+23 -32
57 Sagittarii	6	1.80	+0.5	19 19.7	3 13.5	+4 42.3	-0.5375	0.5789	0.0516	-10 -74
$\sigma$ Capricorni	5½	1.85	-0.8	19 28.0	14 51.1	-8 2.4	+0.3473	0.5750	0.0745	+42 -17
$\pi$ Capricorni	5	-1.86	-1.3	-18 34.7	18 18.6	-4 42.4	-0.3193	0.5729	+0.0807	+5 -56
NEW MOON.										
$\epsilon$ Aquarii	4	1.63	9.1	9 41.9	13 1 22.7	-0 14.4	+1.1030	0.5317	0.1792	+80 +30
$\gamma$ Aquarii	5½	1.61	9.0	8 20.3	1 53.6	+0 15.6	-0.2802	0.5316	0.1794	+19 -53
B. A. C. 8274	7	-1.52	-9.9	-7 0.3	18 6.6	-8 0.5	+1.2530	0.5252	+0.1875	+83 +44
27 Piscium	5	1.47	9.9	4 10.8	23 22.6	-2 53.8	-0.8399	0.5234	0.1892	-11 -90
20 Piscium	5	1.45	9.9	3 39.2	14 1 1.0	-1 18.2	-1.1080	0.5234	0.1900	-30 -90
4 Ceti	6	1.43	10.0	3 10.5	4 6.3	+1 41.6	-1.0440	0.5220	0.1907	-25 -90
5 Ceti	6	1.42	9.9	3 4.5	4 21.2	+1 56.1	-1.1060	0.5219	0.1907	-30 -90
14 Ceti	6	-1.32	-10.3	-1 7.5	18 45.9	-8 4.2	-0.4799	0.5175	+0.1928	+10 -67
15 Ceti	6½	1.31	10.2	-1 7.5	20 7.2	-6 45.2	-0.2198	0.5171	0.1928	+24 -49
26 Ceti	6	1.20	10.3	+0 45.8	15 9 49.9	+6 34.0	+0.3420	0.5151	0.1921	+57 -18
20 Ceti	6½	1.18	10.2	1 24.3	12 3.8	+8 44.2	+0.6625	0.5147	0.1918	+40 -33
33 Ceti	6	1.17	10.1	1 50.8	13 26.6	+10 4.6	-0.1690	0.5144	0.1914	+27 -45
35 Ceti	6½	-1.16	-10.1	+1 52.6	14 30.1	+11 6.3	+0.0110	0.5146	+0.1914	+37 -35
$\nu$ Piscium	5	1.14	10.0	3 1.3	17 19.2	-10 9.4	-0.7164	0.5146	0.1910	-3 -87
$\rho$ Piscium	4½	1.03	9.9	4 55.0	16 5 58.6	+2 8.5	-0.4189	0.5146	0.1873	+14 -61
64 Ceti	5½	0.88	9.2	8 2.5	21 56.9	-6 20.4	-0.0466	0.5145	0.1798	-18 -82
$\zeta$ Ceti	4½	0.87	9.2	8 19.1	22 48.8	-5 30.0	-1.0950	0.5151	0.1792	-29 -82
$\zeta$ Ceti	4½	-0.80	-9.5	+7 57.3	17 6 51.7	+2 19.1	+0.7288	0.5162	+0.1744	+90 +6
B. A. C. 830	6	-0.72	-8.8	+10 15.7	14 23.6	+9 37.9	-0.5296	0.5180	+0.1692	+7 -67

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S				AT CONJUNCTION IN R. A.							Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									
$\mu$ Ceti	4½	-0.72	-9.0	+ 9 38.3	17 15 49.3	+10 52.4	+0.3764	0.5182	+0.1683	+59	-13	
Lalande 5725	6	0.60	8.2	12 45.4	18 2 59.4	- 2 16.9	-1.2440	0.5217	0.1595	-45	-77	
f Tauri	4	0.49	8.3	12 33.0	15 25.9	+ 9 56.1	+0.9175	0.5254	0.1472	+90	+22	
48 Tauri	6	0.26	7.6	15 7.1	19 13 52.0	+ 7 41.2	+1.1189	0.5362	0.1229	+90	+40	
$\gamma$ Tauri	4	0.24	7.5	15 21.3	15 50.0	+ 9 35.6	+1.0940	0.5366	0.1192	+90	+38	
$\delta^1$ Tauri	4	-0.23	-6.9	+17 16.7	17 19.9	+11 2.6	-0.8393	0.5370	+0.1176	-12	-73	
63 Tauri	6	0.22	7.1	16 30.7	17 35.2	+11 17.4	+0.9311	0.5375	0.1170	+35	-25	
$\delta^2$ Tauri	5½	0.22	6.9	17 10.9	17 54.1	+11 35.8	-0.6673	0.5378	0.1167	- 1	-70	
$\theta^1$ Tauri	5	0.21	6.7	17 40.1	18 34.2	-11 45.4	-1.1259	0.5381	0.1155	-35	-72	
70 Tauri	6½	0.21	7.5	15 40.9	18 40.6	-11 39.2	+1.0680	0.5383	0.1155	+90	+37	
75 Tauri	6½	-0.20	-7.3	+16 6.4	20 2.8	-10 19.6	+0.7573	0.5382	+0.1135	+90	+16	
$\theta^2$ Tauri	4	0.20	7.5	15 42.7	20 6.9	-10 15.7	+1.1989	0.5382	0.1135	+90	+59	
B. A. C. 1391	5	0.19	7.4	15 56.9	21 4.4	- 9 19.9	+1.0170	0.5389	0.1122	+90	+35	
$\alpha$ Tauri	1	0.16	7.3	16 16.9	23 39.9	- 6 49.4	+0.9690	0.5408	0.1088	+90	+31	
B. A. C. 1468	6½	0.11	6.5	18 31.7	20 4 36.0	- 2 2.6	-0.9709	0.5432	0.1016	-22	-72	
i Tauri	5½	-0.09	-6.5	+18 38.8	7 1.8	+ 0 18.5	-0.8545	0.5440	+0.0982	-14	-71	
B. A. C. 1526	5½	0.06	7.1	16 58.5	9 55.5	+ 3 6.5	+1.2470	0.5462	0.0938	+90	+59	
m Tauri	5½	-0.01	6.6	18 29.5	14 37.0	+ 7 38.9	+0.0145	0.5478	0.0861	+37	-23	
119 Tauri	5	+0.12	6.7	18 30.4	21 2 10.3	- 5 10.7	+0.8881	0.5535	0.0676	+90	+29	
120 Tauri	6	0.12	6.7	18 27.5	2 46.7	- 4 35.6	+0.9804	0.5540	0.0665	+90	+35	
127 Tauri	6½	+0.16	-6.6	+18 55.4	7 3.6	- 0 27.3	+0.7461	0.5562	+0.0593	+90	+21	
$\chi^1$ Orionis	4½	0.22	6.3	20 15.1	12 15.8	+ 4 34.3	-0.4939	0.5593	0.0502	+13	-44	
$\chi^2$ Orionis	6	0.22	6.4	19 43.4	12 31.1	+ 4 49.1	+0.1777	0.5599	0.0494	+47	-10	
$\chi^3$ Orionis	6	0.26	6.4	19 41.4	16 21.4	+ 8 31.5	+0.3937	0.5676	0.0427	+62	+ 2	
$\chi^4$ Orionis	5	0.26	6.3	20 8.3	16 33.4	+ 8 43.1	-0.0831	0.5610	0.0419	+32	-24	
68 Orionis	6	+0.29	-6.4	+19 48.8	20 11.6	-11 46.3	+0.4072	0.5623	+0.0357	+63	+ 4	
71 Orionis	6	0.30	6.6	19 11.5	21 28.4	-10 32.1	+1.1160	0.5637	0.0330	+90	+50	
15 Geminorum	6½	0.36	6.2	20 51.4	22 3 10.5	- 5 1.9	-0.5106	0.5659	0.0219	+ 7	-49	
16 Geminorum	6½	0.36	6.2	20 33.7	3 15.4	- 4 57.2	-0.1940	0.5659	0.0219	+25	-28	
$\nu$ Geminorum	4½	0.37	6.3	20 16.8	3 42.7	- 4 30.8	+0.1157	0.5663	+0.0208	+43	-10	
$\zeta$ Geminor. <i>mult.</i>	4	+0.51	-6.3	+20 43.9	19 4.0	+10 17.8	-0.9751	0.5728	-0.0097	+20	-32	
56 Geminorum	5½	0.57	6.4	21 39.2	23 2 45.7	- 6 17.0	-0.3264	0.5754	0.0254	+18	-36	
61 Geminorum	6	0.59	6.5	20 28.7	4 54.2	- 4 13.2	-0.1996	0.5755	0.0298	+25	-29	
79 Geminorum	6½	0.66	6.6	20 35.0	12 40.9	+ 3 16.5	-0.6911	0.5777	0.0456	+ 2	-58	
85 Geminorum	6	0.69	6.7	20 10.6	17 9.7	+ 7 35.5	-0.4034	0.5791	0.0549	+13	-44	
$d^1$ Cancri	6	+0.76	-7.1	+18 41.4	24 4 54.5	- 5 5.6	+0.3558	0.5813	-0.0791	+58	+ 3	
$\theta$ Cancri	5½	0.78	7.2	18 28.2	8 23.1	- 1 44.7	+0.2943	0.5813	0.0662	+55	- 7	
$\delta$ Cancri	4	0.81	7.2	18 33.8	13 53.9	+ 3 33.9	-0.3053	0.5816	0.0969	+19	-42	
7 Leonis	6½	0.88	7.8	14 52.7	25 11 29.9	+ 0 22.0	+0.9268	0.5848	0.1389	+90	+25	
$\psi$ Leonis	6	0.90	7.9	14 31.9	14 43.5	+ 3 33.3	+0.8106	0.5820	0.1427	+90	+17	
34 Leonis	6½	+0.91	-7.8	+13 54.4	26 2 36.3	- 9 4.9	-0.3535	0.5899	-0.1616	+17	-51	
37 Leonis	5½	0.91	7.8	14 17.1	4 44.5	- 7 1.5	-1.0320	0.5814	0.1645	-29	-76	
l Leonis	5½	0.93	7.5	11 8.2	18 36.8	+ 6 20.4	-0.3261	0.5790	0.1831	+19	-52	
B. A. C. 3837	6½	0.91	7.3	8 40.3	27 5 12.8	- 7 26.6	+0.1400	0.5775	0.1942	+44	-26	
$\nu$ Virginis	4	0.87	6.8	7 9.3	18 53.9	+ 5 44.8	-1.0831	0.5757	0.2053	-28	-83	
b Virginis	5½	+0.86	-6.5	+ 4 16.6	28 0 58.8	+11 36.6	+0.5224	0.5749	-0.2088	+70	- 7	
c Virginis	5½	0.83	6.0	3 56.1	9 48.8	+ 3 52.4	-0.9065	0.5735	0.2124	-21	-86	
B. A. C. 4254	6	0.80	5.5	+ 2 28.2	17 36.3	+ 3 38.3	-1.2350	0.5735	0.2143	-38	-88	
80 Virginis	6	0.67	3.0	- 4 49.5	29 18 19.3	+ 3 25.4	+0.7711	0.5735	0.2103	+74	+ 6	
88 Virginis	6½	+0.63	-2.4	- 6 16.7	23 59.1	+ 8 47.4	+1.0640	0.5733	-0.2073	+84	+27	
MARCH.												
$\xi^1$ Libræ	6	+0.38	+0.5	-11 26.5	2 4 9.2	-11 54.7	+0.6610	0.5757	-0.1826	+76	0	
$\xi^2$ Libræ	5½	0.37	0.4	10 57.5	5 10.6	-10 55.6	-0.0063	0.5755	0.1815	+32	-37	
17 Libræ	7	+0.36	+0.4	-10 42.2	5 48.8	-10 18.8	-0.3773	0.5757	-0.1805	+12	-60	
18 Libræ	6½	+0.36	+0.6	-10 41.7	6 5.4	-10 2.7	-0.4374	0.5758	-0.1803	+ 9	-64	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.							Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.		
		$\Delta\alpha$	$\Delta\delta$		d h m	h m							
B. A. C. 5070	6	+0.24	+1.2	-11 58.1	2 16 40.6	+0 9.3	-1.0010	0.5781	-0.1668	-27°	-90°		
$\gamma$ Libræ	4½	0.20	2.2	14 24.9	21 33.6	+4 51.5	+0.6671	0.5790	0.1597	+73	+1		
$\eta$ Libræ	6	0.16	2.5	15 18.9	3 1 9.3	+8 19.3	+1.0120	0.5803	0.1539	+75	+24		
48 Libræ	5½	0.06	2.4	13 57.3	7 6.8	-9 56.3	-1.2540	0.5807	0.1447	-54	-90		
49 Libræ	6	+0.07	3.1	16 12.2	8 0.4	-9 4.7	+0.8921	0.5807	0.1432	+74	+15		
$\phi$ Ophiuchi	4½	-0.11	+3.4	-16 22.0	20 51.7	+3 18.0	-0.6406	0.5820	-0.1209	-9	-84		
24 Scorpæ	5½	0.16	3.8	17 31.4	4 1 11.2	+7 27.8	+0.0322	0.5820	0.1126	+27	-34		
29 Ophiuchi	6½	0.27	4.2	18 43.1	9 35.9	-8 26.3	+0.3713	0.5831	0.0964	+46	-15		
B. A. C. 6069	6	0.58	4.0	18 46.7	5 8 2.0	-10 50.5	-1.2280	0.5835	0.0507	-60	-90		
B. A. C. 6098	6	0.63	4.5	20 44.0	10 46.9	-8 11.7	+0.6592	0.5833	0.0447	+63	+1		
$\alpha$ Sagittarii	4	-0.70	+4.5	-21 5.2	15 24.6	-3 44.5	+0.8445	0.5833	-0.0347	+69	+13		
15 Sagittarii	5½	0.70	4.4	20 45.5	16 1.4	-3 9.0	+0.4835	0.5831	0.0337	+48	-9		
16 Sagittarii	6½	0.70	4.2	20 25.1	16 1.9	-3 8.6	+0.1312	0.5831	0.0337	+25	-29		
21 Sagittarii	5	0.75	4.2	20 35.9	20 15.1	+0 55.2	+0.1937	0.5826	0.0247	+28	-25		
B. A. C. 6336	6	0.83	4.3	21 29.3	6 1 29.2	+5 57.7	+1.0220	0.5812	0.0130	+69	+27		
B. A. C. 6347	6	-0.83	+4.1	-21 8.4	1 54.5	+6 22.0	+0.6549	0.5812	-0.0125	+60	+1		
29 Sagittarii	5½	0.89	3.6	20 27.0	6 26.6	+10 44.0	-0.0990	0.5804	-0.0028	+10	-42		
33 Sagittarii	6	0.91	3.9	21 29.7	8 14.6	-11 31.9	+0.9879	0.5798	+0.0012	+69	+24		
$\xi^1$ Sagittarii	5½	0.93	3.6	20 48.0	9 40.0	-10 9.7	+0.2678	0.5798	0.0042	+31	-21		
$\xi^2$ Sagittarii	3½	0.93	3.7	21 15.0	9 49.3	-10 0.7	+0.7389	0.5798	0.0043	+69	+7		
Lalande 35497	6½	-0.94	+3.0	-19 24.4	12 6.5	-7 48.6	-1.1680	0.5788	+0.0092	-57	-90		
B. A. C. 6536	5½	0.97	2.9	19 27.9	14 18.7	-5 41.2	-1.0840	0.5786	0.0136	-49	-90		
$\pi$ Sagittarii	3	0.99	3.3	21 11.9	14 54.3	-5 6.9	+0.7352	0.5782	0.0150	+69	+6		
B. A. C. 6707	6½	1.11	2.0	19 5.9	7 2 18.9	+5 52.8	-1.1610	0.5753	0.0382	-54	-90		
f Sagittarii	5	1.16	1.9	20 1.8	6 34.5	+9 59.1	0.0000	0.5738	0.0472	+20	-36		
57 Sagittarii	6	-1.18	+1.5	-19 19.7	9 6.4	-11 34.4	-0.6124	0.5724	+0.0519	-14	-85		
$\sigma$ Capricorni	5½	1.29	0.6	19 28.0	20 58.5	-0 7.6	+0.2821	0.5679	0.0743	+38	-20		
$\pi$ Capricorni	5	1.31	+0.1	18 34.7	8 0 29.7	+3 16.2	-0.3851	0.5666	0.0811	+2	-61		
$\rho$ Capricorni	5½	1.31	-0.1	18 10.9	1 11.2	+3 56.2	-0.7473	0.5662	0.0821	-19	-90		
$\sigma$ Capricorni	6	1.32	0.0	18 57.1	1 38.0	+4 22.1	+0.1042	0.5658	0.0830	+28	-30		
$\nu$ Capricorni	5½	-1.32	0.0	-18 32.0	6 9.9	+8 44.5	+0.0531	0.5637	+0.0906	+27	-33		
19 Capricorni	6	1.40	-1.1	18 20.8	12 48.3	-8 50.8	+0.4974	0.5615	0.1022	+55	-8		
21 Capricorni	6½	1.41	1.3	17 57.9	15 33.6	-6 11.1	+0.3766	0.5597	0.1067	+48	-15		
$\theta$ Capricorni	4	1.42	1.6	17 40.6	17 52.7	-3 56.7	+0.3220	0.5589	0.1102	+44	-18		
31 Capricorni	6½	1.46	2.0	17 55.9	23 31.8	+1 31.0	+1.2430	0.5563	0.1190	+72	+49		
$\iota$ Capricorni	4½	-1.47	-2.3	-17 18.7	9 1 22.7	+3 18.2	+0.8023	0.5550	+0.1216	+73	+10		
Venus				15 55.3	4 27.0	+6 16.4	-0.3059	0.4234	0.0892	+10	-55		
42 Capricorni	5½	1.49	3.8	14 32.9	10 26.1	-11 56.4	-1.0000	0.5508	0.1344	-29	-90		
44 Capricorni	6	1.49	3.7	14 54.8	11 8.5	-11 15.4	-0.5135	0.5505	0.1354	+1	-71		
45 Capricorni	6½	1.50	3.7	15 15.8	11 34.9	-10 49.8	-0.0805	0.5500	0.1356	+24	-41		
$\mu$ Capricorni	5	-1.50	-4.3	-14 4.8	15 58.2	-6 35.1	-0.7437	0.5482	+0.1413	-12	-90		
$\iota$ Aquarii	4½	1.52	4.8	14 24.9	22 16.1	-0 29.4	+0.5314	0.5450	0.1487	+63	-8		
39 Aquarii	6½	1.53	5.0	14 44.8	10 1 9.2	+2 18.2	+1.3250	0.5437	0.1523	+75	+68		
42 Aquarii	5½	1.53	5.3	13 23.4	3 17.3	+4 22.1	+0.1871	0.5425	0.1545	+41	-26		
45 Aquarii	6½	1.54	5.4	13 52.0	4 21.2	+5 24.1	+0.8702	0.5425	0.1557	+76	+13		
$\sigma$ Aquarii	5	-1.54	-6.1	-11 15.2	10 4.1	+10 56.3	-1.0510	0.5398	+0.1615	-30	-90		
NEW MOON.													
26 Ceti	6	1.39	10.6	+0 45.8	13 17 19.6	-8 8.6	+0.4458	0.5163	0.1940	+64	-12		
29 Ceti	6½	1.38	10.6	1 24.3	19 33.4	-5 58.6	+0.1694	0.5158	0.1934	+46	-27		
33 Ceti	6	-1.37	-10.7	+1 50.8	20 56.1	-4 38.2	-0.0846	0.5156	+0.1932	+32	-41		
35 Ceti	6½	1.37	10.7	1 52.6	21 59.5	-3 36.7	+0.1179	0.5154	0.1931	+43	-30		
f Piscium	5	1.35	10.6	3 1.3	14 0 48.1	-0 52.5	-0.6070	0.5162	0.1927	+3	-77		
$\nu$ Piscium	4½	1.29	10.6	4 55.0	13 26.7	+11 24.3	-0.2934	0.5153	0.1886	+21	-53		
61 Ceti	5½	1.21	10.2	8 2.5	15 5 23.6	+2 54.0	-0.8056	0.5172	0.1816	-8	-82		
$\xi^1$ Ceti	4½	-1.21	-10.2	+8 19.1	6 15.6	+3 44.4	-0.9557	0.5172	+0.1811	-18	-82		
$\xi^2$ Ceti	4½	-1.16	-10.3	+7 57.3	14 18.1	+11 33.2	+0.8853	0.5181	+0.1761	+90	+16		

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination		Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
B. A. C. 830	6	-1.11	-9.9	+10 15.6	15 21 49.8	-5 8.2	-0.3722	0.5195	+0.1704	+16	-56
$\mu$ Ceti	4.4	1.10	10.0	9 38.2	23 6.9	-3 53.3	+0.5389	0.5196	0.1696	+72	-4
Lalande 5725	6	1.03	9.3	12 45.3	16 10 17.7	+6 58.0	-1.1820	0.5223	0.1606	-38	-77
$f$ Tauri	4	0.93	9.3	12 32.9	22 55.7	+4 46.1	+1.1020	0.5256	0.1481	+90	+35
$\gamma$ Tauri	4	0.72	8.2	15 21.3	17 23 30.0	-4 56.7	+1.2920	0.5369	0.1196	+90	+64
$\delta^1$ Tauri	4	-0.71	-7.6	+17 16.7	18 1 1.0	-3 28.6	-0.6563	0.5369	+0.1171	0	-60
63 Tauri	6	0.71	7.8	16 30.7	1 16.2	-3 13.9	+0.2188	0.5346	0.1169	+50	-15
$\delta^2$ Tauri	5.4	0.71	7.6	17 10.9	1 35.4	-2 55.2	-0.4835	0.5346	0.1161	+9	-6
$\delta^3$ Tauri	5	0.71	7.5	17 40.1	2 16.0	-2 15.9	-0.9432	0.5351	0.1156	-19	-72
70 Tauri	6.4	0.70	8.1	15 40.9	2 22.4	-2 9.7	+1.2610	0.5351	0.1154	+90	+58
75 Tauri	6.4	-0.68	-7.9	+16 6.4	3 45.5	-0 49.1	+0.9524	0.5357	+0.1134	+90	+28
B. A. C. 1391	5	0.68	7.9	15 56.9	4 47.9	+0 11.3	+1.2430	0.5362	0.1119	+90	+56
$\alpha$ Tauri	1	0.65	7.8	16 16.9	7 25.1	+2 43.5	+1.1630	0.5367	0.1081	+90	+46
B. A. C. 1468	6.4	0.61	7.1	18 31.7	12 24.8	+7 33.9	-0.7572	0.5398	0.1012	-9	-71
$i$ Tauri	5.4	0.59	7.0	18 38.8	14 52.6	+9 57.0	-0.6734	0.5403	0.0976	-2	-68
$m$ Tauri	5.4	-0.52	-7.0	+18 29.5	22 34.3	-6 36.0	+0.2065	0.5436	+0.0859	+49	-12
119 Tauri	5	0.39	6.9	18 30.4	19 10 19.1	+4 45.9	+1.0850	0.5480	0.0672	+90	+46
120 Tauri	6	0.39	6.9	18 27.5	10 56.0	+5 21.5	+1.1790	0.5488	0.0660	+90	+52
127 Tauri	6.4	0.34	6.7	18 55.4	15 17.8	+9 34.7	+0.9419	0.5503	0.0586	+90	+33
$\gamma^1$ Orionis	4.4	0.27	6.1	20 15.1	20 36.1	-9 17.6	-0.2192	0.5531	0.0490	+24	-32
$\gamma^2$ Orionis	6	-0.28	-6.3	+19 43.4	20 51.7	-9 2.5	+0.3677	0.5531	+0.0487	+60	0
$\gamma^3$ Orionis	6	0.24	6.2	19 41.4	20 0 46.6	-5 15.4	+0.5805	0.5547	0.0416	+79	+12
$\gamma^4$ Orionis	5	0.23	6.1	20 8.3	0 58.8	-5 3.7	+0.1030	0.5549	0.0414	+43	-13
68 Orionis	6	0.19	6.1	19 48.8	4 41.7	-1 28.3	+0.5928	0.5563	0.0347	+80	+14
15 Geminorum	6.4	0.12	5.6	20 51.4	11 49.6	+5 25.1	-0.3327	0.5591	0.0212	+17	-36
16 Geminorum	6.4	-0.11	-5.7	+20 33.7	11 54.6	+5 29.9	-0.0144	0.5591	+0.0212	+36	-17
$\nu$ Geminorum	4.4	-0.11	5.8	20 16.8	12 22.5	+5 56.9	+0.3003	0.5595	+0.0202	+55	0
$\zeta$ Geminorum <i>mult</i>	4	+0.07	5.4	20 43.9	21 4 5.2	-2 53.1	-0.1034	0.5649	-0.0102	+31	-22
56 Geminorum	5.4	0.16	5.4	20 39.2	11 58.1	+4 43.3	-0.1596	0.5670	0.0257	+27	-26
61 Geminorum	6	0.18	5.4	20 28.7	14 9.7	+6 50.3	-0.0354	0.5676	0.0299	+34	-20
79 Geminorum	6.4	+0.26	-5.4	+20 35.0	22 7.7	-9 28.7	-0.4489	0.5694	-0.0460	+11	-46
85 Geminorum	6	0.32	5.4	20 10.6	22 2 42.8	-5 3.3	-0.2491	0.5699	0.0552	+22	-34
$d^1$ Cancri	6	0.43	5.8	18 41.4	14 44.0	+6 31.9	+0.5008	0.5697	0.0789	+71	+5
$\theta$ Cancri	5.4	0.47	5.9	18 28.2	18 17.2	+9 57.5	+0.4357	0.5733	0.0859	+65	+1
$\delta$ Cancri	4	0.53	5.8	18 33.8	23 54.9	-8 37.0	-0.1765	0.5741	0.0569	+26	-34
7 Leonis	6.4	+0.73	-6.6	+14 52.7	23 21 54.6	-11 25.2	+1.0300	0.5769	-0.1374	+90	+32
8 Leonis	5.4	0.73	6.1	16 56.2	22 22.6	-10 58.2	-1.1390	0.5772	0.1380	-35	-73
$\psi$ Leonis	6	0.75	6.7	14 31.9	24 1 16.0	-8 11.0	+0.9131	0.5772	0.1431	+90	+23
34 Leonis	6.4	0.85	6.7	13 54.4	13 12.2	+3 19.2	-0.2766	0.5772	0.1619	+21	-46
37 Leonis	5.4	0.86	6.6	14 17.1	15 21.5	+5 23.7	-1.0120	0.5772	0.1650	-23	-76
$l$ Leonis	5.4	+0.95	-7.1	+11 8.2	25 5 18.9	-5 9.3	-0.2793	0.5772	-0.1841	+21	-49
B. A. C. 3837	6.4	1.00	7.2	8 40.3	15 55.5	+5 4.2	+0.1694	0.5772	0.1960	+46	-25
$\nu$ Virginis	4	1.05	6.9	7 9.3	26 5 32.4	-5 48.5	-1.0770	0.5775	0.2081	-27	-83
$b$ Virginis	5.4	1.08	6.9	4 16.6	11 33.9	-0 0.1	+0.5089	0.5776	0.2118	+69	-8
$c$ Virginis	5.4	1.09	6.6	3 56.1	20 17.1	+8 24.0	-1.0210	0.5782	0.2163	-22	-86
B. A. C. 4254	6	+1.10	-6.4	+2 28.2	27 3 56.9	-8 12.7	-1.2410	0.5782	-0.2181	-42	-82
65 Virginis	6	1.11	5.4	-4 20.4	22 57.3	+10 5.8	+1.2990	0.5808	0.2173	+86	+0
80 Virginis	6	1.10	5.1	4 49.6	28 4 5.7	-8 57.2	+0.6661	0.5820	0.2154	+82	0
88 Virginis	6.4	1.10	4.6	6 16.8	9 27.1	-3 47.6	+0.9460	0.5826	0.2126	+84	+17
$\xi^1$ Libræ	6	0.99	1.9	11 26.5	29 12 51.4	-1 24.7	+0.4991	0.5865	0.1875	+64	-9
$\xi^2$ Libræ	5.4	+0.98	-1.9	-10 57.5	13 50.5	-0 27.8	-0.1626	0.5865	-0.1862	+24	-46
17 Libræ	7	0.98	1.9	10 42.2	14 27.5	+0 7.8	-0.5271	0.5865	0.1856	+4	-71
18 Libræ	6.4	0.97	1.9	10 41.7	14 43.4	+0 23.1	-0.5845	0.5865	0.1850	+1	-77
B. A. C. 5070	6	0.91	1.0	11 58.1	30 0 56.5	+10 13.0	-1.1520	0.5882	0.1710	-39	-90
$\gamma$ Libræ	4.4	0.89	-0.2	14 24.9	5 38.7	-9 15.6	+0.4800	0.5892	0.1637	+60	-10
$\eta$ Libræ	6	+0.86	+0.2	-15 18.9	9 6.8	-5 55.5	+0.8149	0.5898	-0.1584	+75	+10
$\theta$ Libræ	4.4	+0.84	+0.7	-16 24.0	13 2.7	-2 8.5	+1.2840	0.5906	-0.1517	+74	+55

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

Name.	THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.											
	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>										
		$\Delta\alpha$	$\Delta\delta$																		
49 Libræ	6	+0.81	+0.8	-16 12.2	<table><tr><td>d</td><td>h</td><td>m</td></tr><tr><td>30</td><td>15</td><td>43.2</td></tr></table>	d	h	m	30	15	43.2	<table><tr><td>h</td><td>m</td></tr><tr><td>+ 0</td><td>25.8</td></tr></table>	h	m	+ 0	25.8	+0.6931	0.5912	-0.1469	+73	+ 2
d	h	m																			
30	15	43.2																			
h	m																				
+ 0	25.8																				
γ Ophiuchi	4½	0.71	2.1	18 12.1	<table><tr><td>31</td><td>2</td><td>26.3</td></tr></table>	31	2	26.3	<table><tr><td>+10</td><td>44.2</td></tr></table>	+10	44.2	+1.2200	0.5916	0.1269	+72	+45					
31	2	26.3																			
+10	44.2																				
δ Ophiuchi	4½	0.68	1.7	16 22.1	<table><tr><td>4</td><td>7</td><td>9</td></tr></table>	4	7	9	-11 38.1	-0.8250	0.5916	0.1239	-20	-90							
4	7	9																			
24 Scorpæ	5½	0.63	2.2	17 31.5	<table><tr><td>8</td><td>18.8</td></tr></table>	8	18.8	- 7 36.9	-0.1688	0.5924	0.1157	+16	-47								
8	18.8																				
20 Ophiuchi	6½	+0.54	+2.8	-18 43.2	<table><tr><td>16</td><td>27.3</td></tr></table>	16	27.3	+ 0 12.7	+0.1611	0.5923	-0.0985	+33	-27								
16	27.3																				

APRIL.

B. A. C. 6098	6	+0.22	+4.2	-20 44.0	1 16 56.5	- 0 14.7	+0.4370	0.5892	-0.0454	+45	-12
μ Sagittarii	4	0.16	4.4	21 5.2	21 27.7	+ 4 6.1	+0.6177	0.5884	0.0350	+59	- 1
15 Sagittarii	5½	+0.16	+4.3	-20 45.5	22 3.6	+ 4 40.7	+0.2610	0.5884	-0.0341	+33	-22
16 Sagittarii	6½	0.16	4.2	20 25.1	22 4.2	+ 4 41.2	-0.0870	0.5884	0.0340	+13	-42
21 Sagittarii	5	0.10	4.3	20 35.9	2 12.0	+ 8 39.5	-0.0256	0.5871	0.0316	+15	-38
B. A. C. 6336	6	0.03	4.6	21 29.3	7 19.8	-10 24.3	+0.7941	0.5861	0.0136	+69	+10
B. A. C. 6347	6	+0.03	4.4	21 8.4	7 44.7	-10 0.3	+0.4330	0.5861	0.0124	+42	-12
29 Sagittarii	5½	-0.04	+4.2	-20 27.0	12 11.9	- 5 43.2	-0.3132	0.5844	-0.0024	- 2	-56
33 Sagittarii	6	0.06	4.6	21 29.7	13 58.2	- 4 0.9	+0.7671	0.5841	+0.0014	+69	+ 8
ζ <sup>1</sup> Sagittarii	5½	0.09	4.3	20 48.0	15 22.1	- 2 40.2	+0.0517	0.5843	0.0041	+18	-33
ζ <sup>2</sup> Sagittarii	3½	0.09	4.5	21 15.0	15 31.2	- 2 31.5	+0.5172	0.5831	0.0050	+48	- 7
ο Sagittarii	3½	0.14	4.6	21 54.2	18 23.7	+ 0 14.6	+1.2200	0.5824	0.0112	+68	+49
π Sagittarii	3	-0.16	+4.4	-21 11.9	20 32.0	+ 2 18.2	+0.5172	0.5817	+0.0330	+50	- 7
ρ Sagittarii	5	0.36	3.5	20 1.7	3 12 9.9	- 6 46.1	-0.2076	0.5745	0.0477	+ 8	-49
σ Sagittarii	6	0.39	3.2	19 19.6	14 32.5	- 4 20.8	-0.8198	0.5736	0.0530	-26	-90
α Capricorni	5½	0.55	2.7	19 28.0	4 2 21.3	+ 7 2.6	+0.0827	0.5680	0.0752	+26	-32
π Capricorni	5	0.58	2.3	18 34.7	5 51.8	+10 25.6	-0.5791	0.5652	0.0817	- 9	-78
ρ Capricorni	5½	-0.59	+2.1	-18 10.9	6 33.2	+11 5.5	-0.9434	0.5652	+0.0830	-31	-90
ο Capricorni	6	0.60	2.4	18 57.1	7 0.0	+11 31.4	-0.6899	0.5652	0.0836	+18	-42
ν Capricorni	5½	0.65	2.0	18 32.0	11 31.6	- 8 6.4	-0.1395	0.5622	0.0919	+16	-45
19 Capricorni	6	0.72	1.6	18 21.8	18 10.5	- 1 41.2	+0.2749	0.5590	0.1027	+41	-21
21 Capricorni	6½	0.74	1.4	17 57.9	20 56.3	+ 0 58.9	+0.1954	0.5576	0.1073	+36	-25
θ Capricorni	4	-0.77	+1.1	-17 40.6	23 15.6	+ 3 13.5	+0.1404	0.5560	+0.1105	+34	-28
31 Capricorni	6½	0.83	0.8	17 55.9	5 4 56.2	+ 8 42.7	+0.0690	0.5533	0.1195	+72	+29
ι Capricorni	4½	0.85	+0.5	17 18.7	6 47.8	+10 30.6	+0.6292	0.5518	0.1221	+75	- 1
42 Capricorni	5½	0.91	-0.8	14 32.8	15 54.4	- 4 40.8	-1.1650	0.5476	0.1348	-44	-90
45 Aquarii	6½	1.05	2.2	13 51.9	6 9 58.7	-11 11.0	+0.7345	0.5378	0.1563	+75	+ 4
B. A. C. 7835	6½	-1.09	-2.6	-13 29.4	15 24.6	- 5 55.2	+1.1930	0.5353	+0.1618	+77	+39
α Aquarii	5	1.08	3.2	11 15.2	15 44.9	- 5 35.6	-1.1770	0.5352	0.1618	-41	-90
58 Aquarii	6½	1.08	3.2	11 28.8	16 15.6	- 5 5.9	-0.8489	0.5352	0.1624	-16	-90
70 Aquarii	6	1.14	3.8	11 8.9	7 0 40.6	+ 3 3.7	+0.1888	0.5316	0.1700	+44	-26
Lalande 44734	6½	1.15	4.0	10 39.4	2 48.3	+ 5 7.6	+0.0182	0.5299	0.1719	+34	-36
ν <sup>1</sup> Aquarii	4	-1.21	-5.1	- 9 41.9	14 36.7	- 7 25.3	+1.0540	0.5254	+0.1803	+80	+25
ι Aquarii	5½	1.20	5.5	8 20.3	15 8.1	- 6 54.8	-0.3370	0.5254	0.1805	+16	-57
B. A. C. 8274	7	1.26	6.6	7 0.2	8 7 37.6	+ 9 5.6	+1.2570	0.5211	0.1894	+83	+44
27 Piscium	5	1.26	7.3	4 10.7	12 58.1	- 9 43.1	-0.8312	0.5200	0.1916	-10	-90
29 Piscium	5	1.26	7.4	3 39.1	14 37.8	- 8 6.1	-1.0910	0.5194	0.1920	-28	-90
4 Ceti	6	-1.27	-7.7	- 3 10.4	17 45.6	- 5 3.9	-1.0161	0.5184	+0.1929	-22	-90
5 Ceti	6	1.27	7.7	- 3 4.4	18 0.5	- 4 49.5	-1.0790	0.5186	0.1929	-27	-90
NEW MOON.											
α Ceti	4½	1.27	10.0	+ 9 38.2	12 5 38.6	+ 4 25.9	+0.6847	0.5206	0.1718	+88	+ 4
Lalande 5725	6	-1.24	-9.7	+12 45.3	16 49.2	- 8 42.9	-0.9147	0.5238	+0.1626	-16	-77
f Tauri	4	1.20	9.5	12 32.9	13 5 26.9	+ 3 32.3	+1.2010	0.5264	0.1499	+90	+58
B. A. C. 1272	6	1.12	8.5	17 2.3	14 0 8.2	- 2 20.2	-1.0870	0.5327	0.1283	-30	-73
δ <sup>1</sup> Tauri	4	1.08	8.3	17 16.7	7 33.3	+ 4 51.2	-0.4382	0.5358	0.1188	+12	-53
63 Tauri	6	1.08	8.4	16 30.7	7 18.6	+ 5 6.1	+0.4438	0.5358	0.1184	+66	- 3
δ <sup>2</sup> Tauri	5½	-1.08	-8.3	+17 10.9	8 7.8	+ 5 21.7	-0.2620	0.5347	+0.1178	+22	-42
δ <sup>3</sup> Tauri	5	-1.07	-8.1	+17 49.1	8 48.6	+ 6 4.2	-0.7196	0.5353	+0.1168	- 4	-72

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.							Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.		
		$\Delta\alpha$	$\Delta\delta$										
75 Tauri	6½	-1.06	-8.5	+16 6.4	14 10 18.2	+ 7 31.1	+1.1810	0.5357	+0.1152	+90	+47		
B. A. C. 1469	6½	1.01	7.7	18 31.7	18 59.2	- 8 4.2	-0.5545	0.5388	0.1024	+ 6	-60		
i Tauri	5½	1.00	7.6	18 38.8	21 27.5	- 5 40.6	-0.4347	0.5401	0.1008	+13	-51		
m Tauri	5½	0.94	7.4	18 29.5	15 5 11.7	+ 1 48.9	+0.4540	0.5426	0.0872	+67	+ 1		
127 Tauri	6½	0.80	6.8	18 55.4	22 3.1	- 5 52.4	+1.2070	0.5483	0.0590	+90	+56		
$\lambda^1$ Orionis	4½	-0.76	-6.2	+20 15.1	16 3 24.7	- 0 41.5	+0.0420	0.5500	+0.0493	+39	-17		
$\lambda^2$ Orionis	6	0.76	6.4	19 43.4	3 40.5	- 0 26.1	+0.6333	0.5500	0.0491	+85	+15		
$\lambda^3$ Orionis	6	0.72	6.3	19 41.4	7 38.1	+ 3 23.6	+0.8488	0.5508	0.0423	+90	+28		
$\lambda^4$ Orionis	5	0.72	6.2	20 8.3	7 50.6	+ 3 35.7	+0.3679	0.5511	0.0417	+61	+ 1		
68 Orionis	6	0.68	6.1	19 48.8	11 36.4	+ 7 14.0	+0.8656	0.5521	0.0347	+90	+30		
15 Geminorum	6½	-0.62	-5.5	+20 51.4	18 50.4	- 9 46.5	-0.0672	0.5547	+0.0216	+33	-21		
16 Geminorum	6½	0.61	5.6	20 33.7	18 55.4	- 9 41.7	+0.2560	0.5547	0.0216	+52	- 3		
r Geminorum	4½	0.61	5.6	20 16.8	19 23.8	- 9 14.2	+0.5718	0.5552	0.0206	+78	+14		
d Geminorum	6	0.51	4.7	21 53.5	17 5 40.2	+ 0 41.3	-1.0650	0.5571	+0.0013	-30	-68		
$\zeta$ Geminor. mult	4	0.44	5.0	20 43.9	11 23.3	+ 6 12.7	+0.1578	0.5571	-0.0100	+46	- 7		
56 Geminorum	5½	-0.34	-4.8	+20 39.2	19 25.9	-10 1.2	+0.1095	0.5607	-0.0256	+43	-11		
61 Geminorum	6	0.32	4.8	20 28.7	21 40.4	- 7 51.3	+0.2348	0.5607	0.0298	+51	- 5		
63 Geminorum	5½	0.32	4.3	21 40.2	22 0.8	- 7 31.7	-1.0570	0.5610	0.0305	-30	-68		
79 Geminorum	6½	0.23	4.4	20 35.0	18 5 49.8	+ 0 1.1	-0.1837	0.5619	0.0456	+26	-29		
85 Geminorum	6	0.18	4.5	20 10.6	10 31.7	+ 4 33.3	-0.0142	0.5628	0.0551	+38	-19		
SATURN				+20 45.0	19 20.8	-10 56.1	-1.1520	0.5603	-0.0397	-40	-69		
d <sup>1</sup> Cancri	6	-0.01	-4.6	18 41.4	22 52.3	- 7 31.9	+0.7720	0.5645	0.0785	+90	+20		
$\theta$ Cancri	5½	+0.03	4.5	18 28.2	19 2 31.4	- 4 0.5	+0.7042	0.5645	0.0853	+90	+16		
35 Cancri	6½	0.04	3.7	19 58.4	4 8.8	- 2 26.5	-1.0270	0.5650	0.0886	-26	-70		
$\epsilon$ Cancri	6½	0.07	3.9	19 56.5	6 25.1	- 0 15.0	-1.1970	0.5650	0.0930	-44	-70		
$\delta$ Cancri	4	+0.10	-4.3	+18 33.8	8 18.9	+ 1 34.9	+0.0772	0.5650	-0.0948	+41	-20		
80 Cancri	6½	0.23	4.0	18 30.1	20 21.9	-10 47.6	-1.1450	0.5659	0.1176	-36	-71		
83 Cancri	5½	0.27	4.0	18 10.7	23 28.8	- 7 47.1	-1.1830	0.5665	0.1235	-40	-72		
7 Leonis	6½	0.37	4.9	14 52.7	20 6 58.4	- 0 33.4	+1.2760	0.5665	0.1359	+90	+59		
8 Leonis	5½	0.36	4.2	16 56.2	7 26.4	- 0 64.4	-0.9189	0.5665	0.1370	-17	-73		
$\psi$ Leonis	6	+0.41	-4.9	+14 31.9	10 26.1	+ 2 47.1	+1.1520	0.5665	-0.1419	+90	+42		
34 Leonis	6½	0.54	4.8	13 54.4	22 43.9	- 9 21.1	-0.0701	0.5665	0.1609	+33	-34		
37 Leonis	5½	0.56	4.8	14 17.1	0 57.1	- 7 12.7	-0.8191	0.5665	0.1641	-10	-76		
l Leonis	5½	0.71	5.3	11 8.2	15 18.2	+ 6 38.1	+0.1014	0.5671	0.1829	+31	-39		
B. A. C. 3837	6½	0.82	5.7	8 40.3	22 2 11.0	- 6 52.1	+0.3277	0.5690	0.1956	+56	-16		
$\nu$ Virginis	4	+0.96	-5.6	+ 7 9.3	16 6.1	+ 6 33.4	-0.9585	0.5701	-0.2079	-18	-83		
b Virginis	5½	1.02	6.0	4 16.6	22 14.3	-11 31.5	+0.6219	0.5715	0.2121	+80	- 2		
c Virginis	5½	1.09	5.7	3 56.1	23 7 5.5	- 2 59.4	-0.9372	0.5722	0.2167	-16	-87		
B. A. C. 4254	6	1.14	5.7	+ 2 28.2	14 50.9	+ 4 29.3	-1.1780	0.5742	0.2193	-35	-88		
80 Virginis	6	1.29	5.2	- 4 49.6	24 15 5.6	+ 3 51.0	+0.6639	0.5813	0.2180	+82	- 1		
88 Virginis	6½	+1.32	-5.0	- 6 16.8	20 26.0	+ 8 59.6	+0.9266	0.5835	-0.2158	+84	+15		
$\xi^1$ Libræ	6	1.40	3.0	11 26.5	25 23 31.0	+11 3.1	+0.4056	0.5925	0.1919	+57	-15		
$\xi^2$ Libræ	5½	1.40	2.9	10 57.5	26 0 29.0	+11 59.0	-0.2 24	0.5928	0.1905	+19	-52		
17 Libræ	7	1.40	2.8	10 42.2	1 5.4	-11 26.1	-0.6156	0.5928	0.1901	0	-80		
18 Libræ	6½	1.40	2.8	10 41.7	1 21.0	-11 11.1	-0.6743	0.5929	0.1899	- 4	-87		
$\gamma$ Libræ	4½	+1.40	-1.3	-14 24.9	15 56.5	+ 2 50.3	+0.3458	0.5971	-0.1684	+50	-18		
$\eta$ Libræ	6	1.40	0.8	15 18.9	19 19.2	+ 6 5.1	+0.6683	0.5983	0.1631	+72	0		
$\theta$ Libræ	4½	1.39	0.6	16 24.0	23 8.8	+ 9 45.7	+1.1230	0.5991	0.1561	+74	+33		
40 Libræ	6	1.37	-0.1	16 12.2	27 1 44.8	-11 44.5	+0.5319	0.6001	0.1515	+62	- 7		
$\chi$ Ophiuchi	4½	1.34	+1.2	18 12.1	12 8.5	- 1 45.6	+1.0290	0.6015	0.1313	+72	+25		
$\phi$ Ophiuchi	4½	+1.31	+1.0	-16 22.1	13 46.9	- 0 11.1	-0.9899	0.6022	-0.1279	-30	-90		
24 Scorpii	5½	1.30	1.5	17 31.5	17 49.6	+ 3 41.9	-0.3509	0.6029	0.1194	+ 7	-59		
29 Ophiuchi	6½	1.25	2.4	18 43.2	28 1 41.6	+11 15.0	-0.0380	0.6033	0.1021	+22	-39		
B. A. C. 6098	6	1.23	4.5	20 44.0	29 1 18.7	+ 9 55.7	+0.1972	0.6002	0.0474	+30	-25		
$\mu$ Sagittarii	4	0.98	4.9	21 5.2	5 49.3	- 9 53.5	+0.3692	0.5994	0.0370	+40	-16		
14 Sagittarii	6	+0.99	+5.1	-21 44.4	5 51.4	- 9 42.8	+1.0200	0.5994	-0.0365	+68	+26		
15 Sagittarii	5½	+0.98	+4.8	-20 45.5	6 14.9	- 9 20.2	+0.0185	0.6001	-0.0357	+19	-36		

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	HourAngle H	Y	$\alpha'$	$\gamma'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
16 Sagittarii	6½	+0.98	+4.7	-20 25.1	29 6 15.4	-9 19.8	-0.3243	0.6001	-0.6357	+1	-57
21 Sagittarii	5	0.93	5.0	20 35.9	10 14.5	-5 30.2	-0.2660	0.5981	0.0259	+2	-53
B. A. C. 6336	6	0.87	5.5	21 29.3	15 11.5	-0 44.9	+0.5337	0.5969	0.0143	+50	-6
B. A. C. 6347	6	0.86	5.4	21 8.4	15 35.5	-0 21.8	+0.1757	0.5964	0.0134	+26	-27
29 Sagittarii	5½	0.80	5.4	20 27.0	19 53.4	+3 46.0	-0.5610	0.5953	0.0034	-15	-77
31 Sagittarii	6½	+0.80	+5.9	-22 3.0	20 50.6	+4 41.0	+1.0640	0.5942	-0.0010	+68	+30
33 Sagittarii	6	0.79	5.8	21 29.7	21 36.1	+5 24.7	+0.5000	0.5936	+0.0001	+46	-8
$\xi$ Sagittarii	5½	0.77	5.6	20 48.0	22 57.2	+6 42.6	-0.2049	0.5921	0.0041	+4	-49
$\zeta$ Sagittarii	3½	0.77	5.8	21 15.0	23 5.9	+6 50.9	+0.2540	0.5921	0.0042	+30	-22
$\sigma$ Sagittarii	3½	0.74	6.0	21 54.2	30 1 52.6	+9 31.2	+0.9404	0.5919	0.0105	+68	+19
$\pi$ Sagittarii	3	+0.70	+5.9	-21 11.9	3 56.6	+11 30.4	+0.2487	0.5911	+0.0151	+30	-23
50 Sagittarii	6	0.61	6.3	21 59.7	10 39.1	-6 2.5	+1.2180	0.5871	0.0303	+68	+49
f Sagittarii	5	0.49	5.8	20 1.7	18 57.4	+1 57.0	-0.4750	0.5828	0.0479	-6	-69
57 Sagittarii	6	+0.46	+5.5	-19 19.6	21 23.7	+4 17.8	-1.0790	0.5813	+0.0535	-45	-90

MAY.

σ Capricorni	5½	+0.31	+5.6	-19 27.9	1 8 53.1	-8 38.1	-0.1928	0.5736	+0.0763	+11	-48
π Capricorni	5	0.27	5.3	18 34.6	12 18.5	-5 20.2	-0.8470	0.5716	0.0825	-25	-90
ρ Capricorni	5½	0.27	5.2	18 10.8	12 58.9	-4 41.3	-1.2070	0.5715	0.0839	-55	-90
ο Capricorni	6	+0.25	+5.4	-18 57.0	13 25.0	-4 16.1	-0.3676	0.5710	+0.0849	+3	-60
υ Capricorni	5½	0.20	5.2	18 31.9	17 50.5	0 0.0	-0.4126	0.5685	0.0928	+1	-63
19 Capricorni	6	0.11	4.9	18 20.7	2 0 20.7	+6 16.4	-0.0298	0.5637	0.1039	+26	-35
21 Capricorni	6½	0.07	4.8	17 57.8	3 3.2	+8 53.3	-0.0826	0.5618	0.1086	+21	-42
θ Capricorni	4	+0.04	4.6	17 40.5	5 18.9	+11 4.2	-0.1373	0.5605	0.1122	+18	-45
31 Capricorni	6½	-0.03	+4.6	-17 55.8	10 54.3	-7 31.7	+0.7843	0.5564	+0.1211	+72	+8
ι Capricorni	4½	0.06	4.3	17 18.6	12 44.1	-5 45.7	+0.3522	0.5556	0.1238	+48	-17
γ Capricorni	3½	0.17	3.9	17 9.9	20 58.8	+2 12.5	+1.2710	0.5498	0.1352	+73	+52
44 Capricorni	6	0.17	3.1	14 54.6	22 25.0	+3 35.8	-0.9393	0.5494	0.1374	-25	-90
45 Capricorni	6½	0.18	3.2	15 15.6	22 51.3	+4 1.3	-0.5071	0.5490	0.1377	+1	-71
δ Capricorni	2½	-0.20	+3.6	-16 38.0	3 0 14.6	+5 21.8	+1.1520	0.5482	+0.1393	+73	+36
μ Capricorni	5	0.23	2.6	14 4.7	3 13.5	+8 14.9	-1.1570	0.5459	0.1431	-42	-90
ι Aquarii	4½	0.28	2.4	14 24.8	9 30.6	-9 40.1	+0.1252	0.5420	0.1509	+37	-30
39 Aquarii	6½	0.32	2.3	14 44.7	12 24.1	-6 52.2	+0.9230	0.5401	0.1543	+75	+16
42 Aquarii	5½	0.32	1.9	13 23.3	14 32.3	-4 48.0	-0.2064	0.5394	0.1563	+20	-49
45 Aquarii	6½	-0.34	+2.0	-13 51.9	15 36.3	-3 46.0	+0.4756	0.5382	+0.1574	+60	-11
50 Aquarii	6	0.37	1.9	14 5.9	18 15.8	-1 11.6	+1.1520	0.5370	0.1602	+76	+35
B. A. C. 7835	6½	0.40	1.6	13 29.4	21 0.2	+1 27.7	+0.9387	0.5348	0.1629	+77	+17
58 Aquarii	6½	0.39	0.9	11 28.7	21 50.9	+2 16.8	-1.0970	0.5348	0.1640	-33	-90
70 Aquarii	6	0.47	0.4	11 8.8	4 6 13.8	+10 24.3	-0.0524	0.5307	0.1712	+30	-40
Lalande 44734	6½	-0.49	+0.1	-10 39.3	8 21.2	-11 32.2	-0.2188	0.5293	+0.1720	+22	-50
ψ Aquarii	4	0.59	-0.7	9 41.8	20 8.9	-0 5.7	+0.8310	0.5242	0.1815	+80	+10
γ Aquarii	5½	0.59	1.1	8 20.2	20 40.4	+0 24.8	-0.5582	0.5238	0.1819	+4	-74
φ Aquarii	4	0.61	0.7	9 47.7	21 12.5	+0 55.9	+1.1290	0.5237	0.1820	+80	+31
B. A. C. 8274	7	0.73	2.4	7 0.1	5 13 12.0	-7 32.7	+1.0620	0.5182	0.1901	+83	+25
27 Piscium	5	-0.75	-3.4	-4 10.7	18 32.9	-2 20.0	-1.0120	0.5168	+0.1923	-22	-90
29 Piscium	5	0.76	3.7	3 39.1	20 13.9	-0 42.9	-1.2680	0.5164	0.1928	-46	-90
4 Ceti	6	0.78	4.0	3 10.4	23 22.4	+2 20.2	-1.1900	0.5163	0.1938	-37	-90
5 Ceti	6	0.78	4.0	3 4.4	23 37.5	+2 34.9	-1.2530	0.5160	0.1940	-43	-90
14 Ceti	6	0.87	5.3	1 7.4	6 14 15.8	-7 11.7	-0.5434	0.5132	0.1968	+8	-72
15 Ceti	6½	-0.87	-5.1	-1 7.4	15 38.2	-5 51.6	-0.2726	0.5128	+0.1968	+22	-53
26 Ceti	6	0.94	6.2	+0 45.9	7 5 31.2	+7 37.9	+0.3697	0.5125	0.1969	+59	-17
29 Ceti	6½	0.94	6.4	1 24.4	7 46.3	+9 49.2	+0.1016	0.5124	0.1965	+42	-31
33 Ceti	6	0.95	6.5	1 50.9	9 10.1	+11 10.7	-0.1128	0.5123	0.1963	+31	-43
35 Ceti	6½	0.95	6.6	1 52.7	10 14.0	-11 47.2	+0.0647	0.5122	0.1961	+41	-33
f Piscium	5	-0.97	-6.9	+3 1.4	13 4.7	-9 1.3	-0.6489	0.5121	+0.1956	+2	-82
ν Piscium	4½	-1.02	-7.4	+4 55.1	8 1 49.8	+3 22.3	-0.2778	0.5132	+0.1924	+22	-52



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination.		Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
64 Ceti	5 $\frac{1}{2}$	-1.08	-8.2	+ 8 26	8 17 52.4	- 5 22	-0.7199	0.5159	+0.1856	- 3	-82
$\xi$ Ceti	4 $\frac{1}{2}$	1.08	8.2	8 19.2	18 44.4	- 4 11.8	-0.8676	0.5159	0.1850	-12	-82
NEW MOON.											
$\delta$ Tauri	4	1.14	8.1	17 16.7	11 13 29.3	-11 25.4	-0.3069	0.5367	0.1210	+20	-45
$\delta$ Tauri	5 $\frac{1}{2}$	-1.14	-8.1	+17 10.9	14 3.8	-10 51.9	-0.1312	0.5373	+0.1204	+30	-34
$\delta$ Tauri	5	1.14	8.1	17 40.1	14 44.4	-10 12.5	-0.5897	0.5374	0.1194	+ 4	-64
B. A. C. 1468	6 $\frac{1}{2}$	1.12	7.8	18 31.7	12 0 53.2	- 0 22.8	-0.4041	0.5412	0.1048	+14	-49
$i$ Tauri	5 $\frac{1}{2}$	1.12	7.7	18 38.8	3 21.0	+ 2 0.3	-0.3800	0.5412	0.1013	+21	-41
$m$ Tauri	5 $\frac{1}{2}$	1.10	7.3	18 29.5	11 3.7	+ 9 28.3	+0.6262	0.5450	0.0891	+24	+10
$\zeta$ Tauri	3 $\frac{1}{2}$	-1.04	-6.5	+21 4.3	13 1 21.8	- 0 41.4	-1.1130	0.5492	+0.0654	-35	-69
$\gamma$ Orionis	4 $\frac{1}{2}$	1.00	6.4	20 15.1	9 13.8	+ 6 55.1	+0.2400	0.5516	0.0516	+52	- 7
$\gamma$ Orionis	6	1.00	6.5	19 43.4	9 29.6	+ 7 10.4	+0.8408	0.5518	0.0507	+90	+28
$\lambda$ Orionis	6	0.97	6.2	19 41.4	13 27.1	+11 0.0	+1.0620	0.5525	0.0433	+90	+44
$\lambda$ Orionis	5	0.98	6.1	20 8.3	13 39.4	+11 11.9	+0.5795	0.5525	0.0431	+79	+12
68 Orionis	6	-0.95	-5.9	+19 48.8	17 25.3	- 9 9.9	+1.0860	0.5535	+0.0363	+90	+46
15 Geminorum	6 $\frac{1}{2}$	0.92	5.4	20 51.4	14 0 39.8	- 2 9.7	+0.1603	0.5552	0.0230	+47	- 8
16 Geminorum	6 $\frac{1}{2}$	0.92	5.4	20 33.7	0 44.9	- 2 4.8	+0.4845	0.5552	0.0230	+70	+10
$\nu$ Geminorum	4 $\frac{1}{2}$	0.91	5.4	20 16.8	1 13.2	- 1 37.4	+0.8033	0.5555	0.0222	+90	+28
$d$ Geminorum	6	0.83	4.7	21 53.5	11 31.3	+ 8 19.9	-0.8312	0.5573	+0.0024	-12	-68
$\zeta$ Geminor. mult.	4	-0.78	-4.5	+20 43.9	17 16.0	-10 7.2	+0.4130	0.5581	-0.0083	+64	+ 7
56 Geminorum	5 $\frac{1}{2}$	0.71	4.3	20 39.2	15 1 21.8	- 2 17.9	+0.3628	0.5588	0.0243	+60	+ 2
61 Geminorum	6	0.69	4.2	20 28.7	3 37.4	- 0 6.9	+0.4918	0.5588	0.0288	+71	+ 9
63 Geminorum	5 $\frac{1}{2}$	0.69	3.9	21 40.2	3 57.8	+ 0 12.8	-0.8070	0.5588	0.0292	-11	-68
79 Geminorum	6 $\frac{1}{2}$	0.61	3.8	20 35.0	11 51.1	+ 7 49.9	+0.0755	0.5599	0.0445	+42	-15
85 Geminorum	6	-0.56	-3.7	+20 10.6	16 36.2	-11 34.8	+0.2796	0.5599	-0.0537	+54	- 4
SATURN				20 26.0	16 4 28.5	- 0 7.0	-0.7614	0.5514	0.0391	- 8	-70
$d$ Cancri	6	0.43	3.5	18 41.4	5 7.1	+ 0 30.3	+1.0500	0.5599	0.0776	+90	+40
$\theta$ Cancri	5 $\frac{1}{2}$	0.38	3.4	18 28.2	8 49.8	+ 4 5.4	+0.9840	0.5599	0.0843	+90	+34
35 Cancri	6 $\frac{1}{2}$	0.37	2.9	19 58.5	10 28.8	+ 5 41.0	-0.7651	0.5604	0.0879	- 7	-70
$z$ Cancri	6 $\frac{1}{2}$	-0.34	-2.7	+19 56.6	12 47.7	+ 7 55.1	-0.9378	0.5602	-0.0915	-19	-70
$d$ Cancri	4	0.31	3.1	18 33.8	14 43.5	+ 9 47.0	+0.3546	0.5597	0.0951	+59	- 5
80 Cancri	6 $\frac{1}{2}$	0.16	2.8	18 30.2	17 3 1.6	- 2 20.3	-0.8853	0.5594	0.1166	-14	-71
83 Cancri	5 $\frac{1}{2}$	0.13	2.6	18 10.8	6 12.9	+ 0 44.5	-0.9226	0.5594	0.1218	-17	-72
8 Leonis	5 $\frac{1}{2}$	-0.03	2.8	16 56.3	14 23.6	+ 8 38.4	-0.6602	0.5589	0.1356	0	-70
34 Leonis	6 $\frac{1}{2}$	+0.18	-3.1	+13 54.4	18 6 5.9	- 0 11.5	+0.1996	0.5581	-0.1589	+49	-20
37 Leonis	5 $\frac{1}{2}$	0.20	2.9	14 17.2	8 23.2	+ 2 1.1	-0.5650	0.5578	0.1624	+ 6	-66
$l$ Leonis	5 $\frac{1}{2}$	0.40	3.4	11 8.2	23 12.2	- 7 40.2	+0.1529	0.5580	0.1809	+46	-25
B. A. C. 3837	6 $\frac{1}{2}$	0.54	3.8	8 40.3	19 10 26.9	+ 3 11.6	+0.5785	0.5582	0.1932	+76	- 3
$\nu$ Virginis	4	0.72	3.7	7 9.3	20 0 51.1	- 6 53.7	-0.7531	0.5602	0.2058	- 4	-79
$b$ Virginis	5 $\frac{1}{2}$	+0.78	-3.8	+ 4 16.6	7 12.0	- 0 45.9	+0.9812	0.5603	-0.2098	+90	+10
$c$ Virginis	5 $\frac{1}{2}$	0.89	4.1	3 56.1	16 21.2	+ 8 4.3	-0.7570	0.5619	0.2146	- 4	-80
B. A. C. 4254	6	0.99	4.0	+ 2 28.2	21 0 21.8	- 8 11.8	-1.0160	0.5636	0.2177	-21	-88
80 Virginis	6	1.28	4.3	- 4 49.6	22 1 18.5	- 8 8.0	+0.7903	0.5737	0.2175	+85	+ 6
88 Virginis	6 $\frac{1}{2}$	1.34	3.9	6 16.8	6 46.5	- 2 51.8	+1.0400	0.5747	0.2153	+84	+23
$\xi$ Libræ	6	+1.58	-2.8	-11 26.5	23 10 18.9	- 0 20.7	+0.4395	0.5881	-0.1935	+60	-13
$\xi$ Libræ	5 $\frac{1}{2}$	1.58	2.7	10 57.5	11 17.5	+ 0 35.6	-0.2239	0.5887	0.1923	+21	-50
17 Libræ	7	1.58	2.6	10 42.2	11 54.3	+ 1 11.0	-0.5916	0.5892	0.1915	+ 1	-77
18 Libræ	6 $\frac{1}{2}$	1.58	2.6	10 41.7	12 10.0	+ 1 26.2	-0.6503	0.5892	0.1914	- 2	-84
$\gamma$ Libræ	4 $\frac{1}{2}$	1.69	1.3	14 24.9	24 2 50.4	- 8 27.5	+0.3333	0.5969	0.1709	+50	-19
$\eta$ Libræ	6	+1.72	-1.0	-15 18.9	6 13.3	- 5 12.6	+0.6454	0.5985	-0.1657	+71	- 1
$\theta$ Libræ	4 $\frac{1}{2}$	1.75	0.7	16 24.0	10 2.6	- 1 32.2	+1.0900	0.6002	0.1590	+74	+30
49 Libræ	6	1.75	-0.4	16 12.2	12 38.3	+ 0 57.3	+0.4918	0.6011	0.1539	+59	-10
$\chi$ Ophiuchi	4 $\frac{1}{2}$	1.77	+0.8	18 12.1	22 58.3	+10 52.5	+0.9623	0.6047	0.1342	+72	+20
$\phi$ Ophiuchi	4 $\frac{1}{2}$	1.75	0.9	16 22.1	25 0 35.7	-11 34.1	-1.0540	0.6050	0.1308	-36	-90
24 Scorpis	5 $\frac{1}{2}$	+1.77	+1.3	-17 31.5	4 36.0	- 7 43.5	-0.4246	0.6066	-0.1221	+ 3	-64
29 Ophiuchi	6 $\frac{1}{2}$	+1.77	+2.3	-18 43.2	12 21.9	- 0 16.5	-0.1362	0.6080	-0.1058	+16	-15

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0. $\Delta\alpha$   $\Delta\delta$	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	$z'$	$y'$	N.	S.	
B. A. C. 6098	6	+1.70	+4.9	-20 44.0	26 11 30.9	- 2 4.3	+0.0513	0.6082	-0.0495	+22	-34
" Sagittarii	4	1.68	5.4	21 5.2	15 45.9	+ 2 0.2	+0.2106	0.6074	0.0393	+30	-25
14 Sagittarii	6	1.68	5.5	21 44.4	15 56.8	+ 2 10.7	+0.8541	0.6074	0.0389	+68	+13
15 Sagittarii	5½	1.67	5.4	20 45.5	16 19.4	+ 2 32.4	-0.1360	0.6071	0.0381	+11	-45
16 Sagittarii	6½	1.67	5.4	20 25.1	16 20.2	+ 2 33.1	-0.4758	0.6071	0.0380	- 8	-69
21 Sagittarii	5	+1.63	+5.8	-20 35.9	20 13.1	+ 6 16.5	-0.4259	0.6071	-0.0283	- 6	-65
B. A. C. 6336	6	1.61	6.4	21 29.3	27 1 1.8	+10 53.5	+0.3573	0.6064	0.0163	+37	-17
B. A. C. 6347	6	1.60	6.4	21 8.4	1 25.3	+11 16.1	+0.0017	0.6057	0.0152	+16	-37
29 Sagittarii	5½	1.57	6.6	20 27.0	5 35.7	- 8 43.7	-0.7323	0.6038	0.0053	-25	-90
30 Sagittarii	6½	1.57	6.9	22 17.3	6 1.0	- 8 19.4	+1.1100	0.6038	0.0040	+68	+34
31 Sagittarii	6½	+1.57	+6.9	-22 3.0	6 31.2	- 7 50.4	+0.8710	0.6038	-0.0027	+68	+15
33 Sagittarii	6	1.56	6.9	21 29.7	7 15.5	- 7 7.9	+0.3116	0.6036	-0.0010	+33	-19
ξ¹ Sagittarii	5½	1.54	6.9	20 48.0	8 34.1	- 5 52.5	-0.3852	0.6025	+0.0023	- 6	-62
ξ² Sagittarii	3½	1.54	6.9	21 15.0	8 42.7	- 5 44.2	+0.0671	0.6025	0.0027	+19	-33
ο Sagittarii	3½	1.52	7.3	21 54.2	11 24.3	- 3 9.1	+0.7399	0.6012	0.0092	+68	+ 6
π Sagittarii	3	+1.50	+7.3	-21 11.9	13 24.7	- 1 13.5	+0.0538	0.6008	+0.0143	+19	-34
50 Sagittarii	6	1.43	8.0	21 59.7	19 54.6	+ 5 1.0	+1.0030	0.5980	0.0294	+68	+25
f Sagittarii	5	1.33	7.9	20 1.7	28 3 57.1	-11 15.4	-0.6792	0.5919	0.0479	-18	-90
σ Capricorni	5½	1.16	8.5	19 27.9	17 26.0	+ 1 42.6	-0.4195	0.5835	0.0768	- 1	-64
π Capricorni	5	1.12	8.4	18 34.6	20 44.7	+ 4 53.9	-1.0700	0.5813	0.0830	-41	-90
ο Capricorni	6	+1.10	+8.5	-18 57.0	21 48.7	+ 5 55.5	-0.5797	0.5811	+0.0853	-10	-80
ν Capricorni	5½	1.05	8.4	18 31.9	29 2 6.2	+10 3.4	-0.6454	0.5769	0.0938	-12	-86
19 Capricorni	6	0.98	8.5	18 20.7	8 24.2	- 7 52.3	-0.2146	0.5725	0.1053	+13	-50
20 Capricorni	6½	0.94	8.9	19 28.0	10 27.5	- 5 53.4	+1.1690	0.5725	0.1090	+70	+39
21 Capricorni	6½	0.94	8.5	17 57.8	11 1.7	- 5 20.5	-0.3275	0.5705	0.1098	+ 8	-57
θ Capricorni	4	+0.91	+8.4	-17 40.5	13 14.2	- 3 12.7	-0.3819	0.5694	+0.1134	+ 5	-61
30 Capricorni	5½	0.85	8.5	18 27.1	18 30.2	+ 1 52.2	+1.0470	0.5644	0.1224	+72	+27
31 Capricorni	6½	0.85	8.4	17 55.8	18 38.8	+ 2 0.5	+0.5208	0.5644	0.1224	+58	- 8
ι Capricorni	4½	0.82	8.2	17 18.6	20 25.2	+ 3 43.1	+0.0925	0.5633	0.1253	+32	-31
ζ Capricorni	3½	0.72	8.2	17 9.9	30 4 26.1	+11 27.5	+0.9947	0.5573	0.1372	+73	+22
44 Capricorni	6	+0.71	+7.4	-14 54.6	5 50.0	-11 11.5	-1.1900	0.5571	+0.1390	-46	-90
45 Capricorni	6½	0.70	7.5	15 15.6	6 15.5	-10 46.8	-0.7608	0.5568	0.1393	-13	-90
α Capricorni	2½	0.68	7.4	16 38.0	7 36.6	- 9 28.5	+0.8786	0.5547	0.1414	+74	+14
ι Aquarii	4½	0.58	7.1	14 24.7	16 38.5	- 0 44.6	-0.1414	0.5483	0.1525	+23	-45
39 Aquarii	6½	0.54	7.1	14 44.6	19 27.7	+ 1 59.0	+0.6460	0.5457	0.1560	+72	- 1
42 Aquarii	5½	+0.53	+6.8	-13 23.2	21 33.0	+ 4 0.3	-0.4326	0.5450	+0.1582	+ 8	-61
45 Aquarii	6½	0.51	6.9	13 51.8	22 35.6	+ 5 0.9	+0.2057	0.5434	0.1594	+43	-26
50 Aquarii	6	0.47	6.9	14 5.8	31 1 11.5	+ 7 31.7	+0.8722	0.5419	0.1620	+76	+13
B. A. C. 7835	6½	0.44	6.6	13 29.3	3 52.3	+10 7.4	+0.6619	0.5401	0.1648	+74	- 1
70 Aquarii	6	0.35	5.5	11 8.7	12 55.0	- 5 7.0	-0.3166	0.5344	0.1730	+16	-56
Lalande 44734	6½	+0.33	+5.2	-10 39.2	15 0.0	- 3 5.8	-0.4839	0.5332	+0.1749	+ 7	-68
71 Aquarii	6	+0.32	+5.7	-12 12.7	15 22.0	- 2 44.6	+1.2560	0.5332	+0.1751	+78	+15

JUNE.

η¹ Aquarii	4	+0.21	+4.4	- 9 41.7	1 2 36.3	+ 8 9.2	+0.5639	0.5266	+0.1831	+70	- 6
γ Aquarii	5½	0.21	3.9	8 20.1	3 7.3	+ 8 39.2	-0.8108	0.5261	0.1832	-10	-90
η² Aquarii	4	0.20	4.4	9 47.6	3 39.0	+ 9 9.9	+0.8594	0.5258	0.1837	+80	+11
B. A. C. 8274	7	0.04	2.8	7 0.1	19 27.2	+ 0 30.1	+0.8091	0.5199	0.1921	+83	+ 8
27 Piscium	5	+0.01	+1.6	4 10.6	2 0 46.0	+ 5 39.6	-1.2510	0.5181	0.1938	-43	-90
14 Ceti	6	-0.15	-0.3	- 1 7.3	20 21.3	+ 0 41.2	-0.7652	0.5131	+0.1981	- 5	-90
15 Ceti	6½	0.18	0.3	- 1 7.3	21 43.4	+ 2 1.1	-0.4937	0.5124	0.1981	+10	-68
26 Ceti	6	0.28	1.6	+ 0 46.0	3 11 34.7	- 8 31.2	+0.1676	0.5110	0.1978	+47	-28
29 Ceti	6½	0.30	1.8	1 24.5	13 49.9	- 6 19.7	-0.0995	0.5105	0.1974	+31	-42
33 Ceti	6	0.31	2.0	1 51.0	15 13.7	- 4 58.3	-0.3094	0.5104	0.1972	+21	-55
35 Ceti	6½	-0.32	-2.1	+ 1 52.8	16 17.6	- 3 56.4	-0.1326	0.5104	+0.1971	+30	-44
f Piscium	5	-0.33	-2.4	+ 3 1.5	19 8.3	- 1 10.2	-0.8414	0.5109	+0.1969	-10	-87

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
$\nu$ Piscium	4½	-0.43	-3.5	+ 4 55.1	4 7 54.2	+11 14.2	-0.4466	0.5116	+0.1934	+13	-64
64 Ceti	5½	0.52	4.9	8 2.6	23 58.7	+ 2 51.5	-0.8574	0.5135	0.1866	-11	-82
$\xi^1$ Ceti	4½	0.53	5.0	8 19.2	5 0 51.0	+ 3 42.2	-1.0040	0.5135	0.1866	-21	-82
$\xi^2$ Ceti	4½	0.58	5.1	7 57.4	8 56.3	+11 33.8	+0.8872	0.5157	0.1816	+90	+15
B. A. C. 830	6	0.63	5.7	10 15.7	16 30.0	- 5 5.6	-0.3222	0.5176	0.1762	+19	-53
$\mu$ Ceti	4½	-0.64	-5.6	+ 9 38.3	17 47.1	- 3 50.7	+0.5983	0.5180	+0.1754	+78	- 2
Lalande 5725	6	0.69	6.5	12 45.4	6 4 59.2	+ 7 1.9	-0.9519	0.5217	0.1665	-18	-77
f Tauri	4	0.77	6.3	12 33.0	17 36.9	- 4 42.7	+1.3030	0.5260	0.1542	+90	+60
B. A. C. 1272	6	0.84	7.0	17 2.3	7 12 14.7	-10 38.8	-0.9908	0.5339	0.1328	-22	-73
$\delta^1$ Tauri	4	0.88	7.0	17 16.7	19 37.3	- 3 20.9	-0.3118	0.5374	0.1233	+20	-45
NEW MOON.											
$\nu$ Geminorum	4½	-0.90	-5.2	+20 16.8	10 6 59.0	+ 5 55.8	+0.9001	0.5524	+0.0238	+90	+34
d Geminorum	6	0.89	4.6	21 53.5	17 12.1	- 8 12.0	-0.7119	0.5602	+0.0040	- 4	-66
$\zeta$ Geminor. mult.	4	0.86	4.5	20 43.9	22 54.0	- 2 41.8	+0.5370	0.5610	-0.0072	+75	+14
$\delta$ Geminorum	3½	-0.83	-3.9	+22 11.2	11 6 5.0	+ 4 14.5	-1.1410	0.5619	-0.0216	-38	-68
56 Geminorum	5½	0.82	4.1	20 39.2	6 56.3	+ 5 3.9	+0.4999	0.5623	0.0231	+71	+10
61 Geminorum	6	0.81	4.0	20 28.7	9 11.0	+ 7 14.0	+0.6324	0.5623	0.0276	+85	+17
63 Geminorum	5½	0.81	3.8	21 40.2	9 31.3	+ 7 33.6	-0.6648	0.5623	0.0243	- 1	-61
79 Geminorum	6½	0.75	3.5	20 35.0	17 21.7	- 8 52.2	+0.2266	0.5627	0.0431	+51	- 6
85 Geminorum	6	-0.72	-3.4	+20 10.6	22 5.3	- 4 18.3	+0.4363	0.5627	-0.0528	+66	+ 4
d <sup>1</sup> Cancri	6	0.62	3.0	18 41.5	12 10 33.3	+ 7 43.8	+1.2400	0.5618	0.0769	+90	+56
$\theta$ Cancri	5½	0.59	2.8	18 28.3	14 15.6	+11 18.5	+1.1570	0.5615	0.0832	+90	+48
SATURN				19 51.4	14 40.5	+11 42.6	-0.3601	0.5500	0.0389	+15	-10
35 Cancri	6½	0.59	2.4	19 58.5	15 54.5	-11 6.0	-0.5919	0.5615	0.0864	+ 4	-61
39 Cancri	6½	-0.58	-2.1	+20 24.2	18 3.5	- 9 1.4	-1.2370	0.5610	-0.0902	-49	-70
40 Cancri	6½	0.58	2.1	20 22.0	18 5.7	- 8 59.3	-1.2010	0.5610	0.0904	-14	-70
$\epsilon$ Cancri	6½	0.58	2.2	19 56.6	18 13.1	- 8 52.1	-0.7598	0.5610	0.0904	- 7	-70
$\delta$ Cancri	4	0.56	2.4	18 33.9	20 9.0	- 7 0.2	+0.5338	0.5610	0.0943	+74	+ 5
89 Cancri	6½	0.44	1.8	18 30.2	13 8 28.3	+ 4 53.7	-0.6955	0.5591	0.1161	- 3	-71
83 Cancri	5½	-0.40	-1.7	+18 10.8	11 40.2	+ 7 59.2	-0.7297	0.5584	-0.1212	- 4	-72
8 Leonis	5½	0.31	1.6	16 56.3	19 53.6	- 8 4.3	-0.4648	0.5573	0.1344	+11	-56
34 Leonis	6½	0.12	1.7	13 54.5	11 11 45.0	+ 7 15.1	+0.4077	0.5573	0.1535	+63	- 9
37 Leonis	5½	-0.10	1.4	14 17.2	14 4.0	+ 9 29.3	-0.3600	0.5547	0.1609	+17	-52
l Leonis	5½	+0.09	1.7	11 8.3	15 5 7.0	+ 0 2.1	+0.3680	0.5530	0.1794	+60	-14
B. A. C. 3837	6½	+0.23	-1.9	+ 8 40.4	16 35.8	+11 8.0	+0.7930	0.5513	-0.1910	+90	+10
$\nu$ Virginis	4	0.43	1.8	7 9.4	16 7 21.6	+ 1 24.3	-0.5547	0.5516	0.2030	+ 7	-71
b Virginis	5½	0.52	2.4	4 16.7	13 53.1	+ 7 42.7	+1.0590	0.5518	0.2072	+90	+25
c Virginis	5½	0.64	2.1	3 56.2	23 19.0	- 7 10.3	-0.5714	0.5533	0.2118	+ 6	-74
B. A. C. 4254	6	0.74	2.1	+ 2 28.3	17 7 35.0	+ 0 49.1	-0.8406	0.5551	0.2150	- 9	-84
80 Virginis	6	+1.10	-3.0	- 4 49.5	18 9 23.3	+ 1 44.6	+0.9629	0.5624	-0.2146	+85	+17
84 Virginis	6½	1.18	3.0	6 16.7	15 3.0	+ 7 12.2	+1.2090	0.5632	0.2128	+84	+38
$\xi^1$ Libræ	6	1.56	2.1	11 26.5	19 19 30.8	+10 39.1	+0.5513	0.5786	0.1916	+68	- 7
$\xi^2$ Libræ	5½	1.57	1.9	10 57.5	20 31.2	+11 57.3	-0.1226	0.5791	0.1907	+26	-44
17 Libræ	7	1.57	1.7	10 42.2	21 9.1	-11 46.2	-0.4950	0.5794	0.1901	+ 7	-69
18 Libræ	6½	+1.57	-1.7	-10 41.7	21 25.3	-11 30.6	-0.5546	0.5798	-0.1898	+ 3	-74
B. A. C. 5070	6	1.68	1.0	11 58.1	20 7 46.7	- 1 32.4	-1.1910	0.5855	0.1770	-42	-90
$\gamma$ Libræ	4½	1.74	1.0	14 24.9	12 30.7	+ 3 0.8	+0.4131	0.5887	0.1700	+55	-14
$\eta$ Libræ	6	1.79	0.7	15 18.9	15 58.7	+ 6 29.9	+0.7209	0.5898	0.1648	+74	+ 3
$\theta$ Libræ	4½	1.83	0.6	16 24.0	19 53.6	+10 6.8	+1.1630	0.5925	0.1586	+74	+36
49 Libræ	6	+1.86	-0.1	-16 12.2	22 32.8	-11 20.1	+0.5543	0.5940	-0.1542	+63	- 6
$\gamma$ Ophiuchi	4½	1.97	+0.9	18 12.1	21 9 5.2	- 1 12.5	+1.0089	0.5991	0.1348	+72	+23
$\phi$ Ophiuchi	4½	1.96	1.4	16 22.1	10 44.5	+ 0 22.9	-1.0280	0.5995	0.1317	-33	-90
24 Scorpui	5½	2.00	1.6	17 31.5	14 48.6	+ 4 17.2	-0.4025	0.6015	0.1232	+ 4	-63
29 Ophiuchi	6½	2.05	2.5	18 43.2	22 40.7	+11 50.4	-0.1238	0.6028	0.1063	+17	-44
B. A. C. 6098	6	+2.13	+5.3	-20 44.0	22 21 58.5	+10 11.4	+0.0199	0.6087	-0.0518	+20	-36
$\mu$ Sagittarii	4	+2.13	+5.8	-21 5.2	23 2 13.5	- 9 44.1	+0.1761	0.6089	-0.0411	+28	-27



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$	d h m	h m					
14 Sagittarii	6	+2.14	+5.9	-21 44.4	23 2 24.3	-9 33.6	+0.8191	0.6089	-0.0405	+68 11
15 Sagittarii	5½	2.13	5.9	20 45.5	2 47.2	-9 11.7	-0.1744	0.6089	0.0396	+9 -48
16 Sagittarii	6½	2.12	5.9	20 25.1	2 47.7	-9 11.3	-0.5148	0.6089	0.0396	-10 -73
21 Sagittarii	5	2.13	6.4	20 36.1	6 40.0	-5 28.4	-0.4659	0.6091	0.0299	-8 -69
B. A. C. 6336	6	2.13	7.0	21 29.3	11 27.6	-0 52.5	+0.3050	0.6082	0.0179	+34 -20
B. A. C. 6347	6	+2.12	+7.0	-21 8.4	11 50.8	-0 39.3	-0.0500	0.6080	-0.0170	+13 -41
29 Sagittarii	5½	2.11	7.5	20 27.0	15 59.7	+3 28.5	-0.7896	0.6071	0.0067	-28 -90
30 Sagittarii	6½	2.13	7.7	22 17.3	16 24.8	+3 52.6	+1.0100	0.6070	0.0053	+68 +29
31 Sagittarii	6½	2.12	7.7	22 3.0	16 54.8	+4 21.3	+0.8079	0.6067	0.0043	+68 +10
33 Sagittarii	6	2.11	7.8	21 29.7	17 38.5	+5 3.3	+0.2487	0.6067	-0.0025	+29 -23
ξ Sagittarii	5½	+2.10	+7.9	-20 48.0	18 56.6	+6 18.2	-0.4181	0.6067	+0.0008	-9 -67
ξ Sagittarii	3½	2.11	7.9	21 15.0	19 5.1	+6 26.3	+0.0033	0.6066	0.0012	+15 -37
π Sagittarii	3½	2.10	8.3	21 54.2	21 45.3	+9 0.0	+0.6716	0.6060	0.0077	+62 +2
π Sagittarii	3	2.08	8.4	21 11.9	23 44.3	+10 54.3	-0.0184	0.6052	0.0124	+15 -38
50 Sagittarii	6	2.06	9.2	21 59.6	24 6 9.8	-6 55.7	+0.9158	0.6026	0.0279	+68 +18
f Sagittarii	5	+2.00	+9.7	-29 1.6	14 5.3	+0 40.9	-0.7723	0.5984	+0.0469	-24 -90
σ Capricorni	5½	1.89	10.7	19 27.8	25 3 19.7	-10 35.6	-0.5305	0.5912	0.0761	-7 -74
π Capricorni	5	1.86	10.7	18 34.5	6 34.4	-7 28.4	-1.1790	0.5889	0.0817	-52 -90
o Capricorni	6	1.86	10.9	18 56.9	7 37.5	-6 27.7	-0.7086	0.5876	0.0854	-16 -90
v Capricorni	5½	1.81	11.0	18 31.8	11 49.0	-2 25.7	-0.7656	0.5843	0.0938	-19 -90
19 Capricorni	6	+1.76	+11.4	-18 20.6	17 58.7	+3 30.2	-0.3431	0.5809	+0.1057	+6 -58
20 Capricorni	6½	1.73	11.7	19 27.9	19 59.1	+5 26.2	+1.0280	0.5793	0.1095	+71 +25
21 Capricorni	6½	1.73	11.5	17 57.7	20 32.4	+5 58.2	-0.4605	0.5785	0.1105	0 -67
θ Capricorni	4	1.70	11.5	17 40.4	22 41.9	+8 3.0	-0.5144	0.5765	0.1141	-2 -72
39 Capricorni	5½	1.65	11.9	18 27.0	26 3 50.4	-10 59.7	+0.8982	0.5725	0.1229	+72 +15
31 Capricorni	6½	+1.65	+11.8	-17 55.7	3 58.7	-10 51.6	+0.3741	0.5723	+0.1233	+48 -16
γ Capricorni	4½	1.63	11.7	17 18.5	5 42.6	-9 11.5	-0.0501	0.5715	0.1261	+24 -40
γ Capricorni	3½	1.54	11.8	17 9.8	13 31.7	-1 39.0	+0.8333	0.5653	0.1384	+73 +11
45 Capricorni	6½	1.52	11.4	15 15.5	15 19.4	+0 5.0	-0.9026	0.5648	0.1409	-22 -90
δ Capricorni	2½	1.51	11.8	16 37.9	16 37.3	+1 20.1	+0.7148	0.5624	0.1427	+73 +3
ι Aquarii	4½	+1.41	+11.3	-14 24.6	27 1 25.5	+9 50.3	-0.2779	0.5555	+0.1544	+15 -54
39 Aquarii	6½	1.38	11.4	14 44.5	4 10.4	-11 30.4	+0.7549	0.5540	0.1576	+70 +5
42 Aquarii	5½	1.36	11.1	13 23.1	6 12.6	-9 32.2	-0.6263	0.5526	0.1691	-3 -82
45 Aquarii	6½	1.34	11.2	13 51.7	7 13.6	-8 33.3	+0.0386	0.5514	0.1610	+33 -35
50 Aquarii	6	1.31	11.3	14 5.7	9 45.6	-6 6.3	+0.6960	0.5496	0.1639	+76 +1
B. A. C. 7835	6½	+1.29	+11.1	-13 29.2	12 22.6	-3 34.4	+0.4895	0.5480	+0.1663	+62 -10
70 Aquarii	6	1.29	10.4	11 8.6	21 12.0	+4 57.8	-0.4861	0.5414	0.1751	+7 -68
Lalande 44734	6½	1.18	10.2	10 39.1	23 14.0	+6 56.0	-0.6507	0.5404	0.1768	-2 -84
74 Aquarii	6	1.17	10.6	12 12.6	23 35.6	+7 16.8	+1.0690	0.5400	0.1772	+78 +26
ψ Aquarii	4	1.06	9.6	9 41.6	28 10 34.4	-6 5.0	+0.3894	0.5334	0.1854	+57 -16
χ Aquarii	5½	+1.06	+9.1	-8 20.0	11 4.7	-5 35.6	-0.9822	0.5331	+0.1858	-22 -90
ψ Aquarii	4	1.05	9.6	9 47.5	11 35.8	-5 5.5	+0.6750	0.5325	0.1859	+78 0
ψ Aquarii	4½	1.04	9.8	10 13.2	12 7.1	-4 35.1	+1.2320	0.5319	0.1861	+80 +42
B. A. C. 8271	7	0.89	8.2	7 0.0	29 3 4.8	+9 55.3	+0.6216	0.5246	0.1938	+77 -3
14 Ceti	6	0.67	5.3	1 7.2	30 3 35.5	+9 43.1	-0.9383	0.5157	0.1995	-16 -90
15 Ceti	6½	+0.65	+5.3	-1 7.2	4 56.5	+11 1.8	-0.6685	0.5140	+0.1995	+1 -85
26 Ceti	6	0.53	3.9	+0 46.1	18 39.0	+0 20.7	-0.0055	0.5128	0.1991	+37 -37
29 Ceti	6½	0.51	3.6	1 24.6	20 52.9	+2 30.9	-0.2674	0.5122	0.1988	+22 -52
33 Ceti	6	0.50	3.4	1 51.1	22 15.9	+3 51.5	-0.4780	0.5118	0.1984	+11 -67
35 Ceti	6½	+0.49	+3.3	+1 52.9	23 19.3	+4 53.1	-0.3004	0.5117	+0.1982	+21 -55

JULY.

f Piscium	5	+0.48	+2.8	+3 1.5	1 2 8.8	+7 37.9	-1.0020	0.5119	+0.1978	-20 -87
v Piscium	4½	0.36	+1.6	4 55.2	14 50.0	-4 2.5	-0.6040	0.5122	0.1945	+3 -79
64 Ceti	5½	+0.23	-0.2	+8 2.7	2 6 51.5	+11 31.9	-1.0020	0.5130	+0.1873	-21 -82
ξ Ceti	4½	+0.23	-0.3	+8 19.3	7 43.7	-11 37.5	-1.1440	0.5133	+0.1867	-32 -82

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Magn.	Red'ns from 1888.0.	Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.	
		$\Delta\alpha$	$\Delta\delta$		d h m						
$\xi^2$ Ceti	4½	+0.15	-0.6	+ 7 57.5	2 15 48.4	- 3 46.5	+0.7467	0.5152	+0.1821	+90 + 7	
B. A. C. 830	6	0.09	1.5	10 15.8	23 22.0	+ 3 34.0	-0.4510	0.5166	0.1771	+12 -62	
$\mu$ Ceti	4½	0.08	1.3	9 38.4	3 0 39.2	+ 4 49.0	+0.4677	0.5171	0.1760	+67 - 9	
Lalande 5725	6	+0.01	2.7	12 45.5	11 51.8	- 8 17.8	-1.0670	0.5202	0.1669	-26 -77	
f Tauri	4	-0.11	3.1	12 33.0	4 0 30.3	+ 3 58.2	+1.1990	0.5243	0.1549	+90 +43	
B. A. C. 1272	6	-0.23	-4.5	+17 2.3	19 9.4	- 1 56.5	-1.0700	0.5327	+0.1339	-28 -73	
$\delta^1$ Tauri	4	0.20	4.7	17 16.7	5 2 32.2	+ 5 12.6	-0.3823	0.5357	0.1237	+16 -50	
63 Tauri	6	0.29	4.5	16 30.7	2 47.3	+ 5 27.2	+0.4945	0.5357	0.1236	+70 - 1	
$\delta^2$ Tauri	5½	0.29	4.7	17 10.9	3 6.5	+ 5 45.9	-0.2659	0.5357	0.1234	+26 -39	
$\delta^3$ Tauri	5	0.30	4.8	17 40.1	3 46.9	+ 6 25.0	-0.6582	0.5362	0.1223	0 -69	
75 Tauri	6½	-0.31	-4.5	+16 6.4	5 16.0	+ 7 51.4	+1.2439	0.5370	+0.1292	+90 +64	
B. A. C. 1468	6½	0.37	5.0	18 31.7	13 52.9	- 7 48.0	-0.4423	0.5414	0.1079	+12 -52	
i Tauri	5½	0.38	4.9	18 38.8	16 20.0	- 5 25.6	-0.3123	0.5424	0.1046	+20 -43	
m Tauri	5½	0.42	5.0	18 29.5	23 59.3	+ 1 58.9	+0.6099	0.5465	0.0924	+82 +10	
z Tauri	3½	0.51	5.3	21 4.3	6 14 8.9	- 8 19.3	-1.0761	0.5526	0.0686	-31 -69	
$\gamma^1$ Orionis	4½	-0.55	-5.2	+20 15.1	21 55.0	- 0 48.8	+0.3000	0.5550	+0.0545	+56 - 4	
NEW MOON.											
$\delta$ Cancri	4	0.55	2.2	18 33.9	10 2 6.4	+ 0 44.6	+0.0584	0.5657	-0.0942	+41 -21	
SATURN				19 5.3	2 31.7	+ 1 11.9	-0.0177	0.5522	0.0913	+36 -24	
80 Cancri	6½	-0.50	-1.5	+18 30.2	14 15.9	-11 31.3	-0.6295	0.5640	-0.1159	+ 2 -66	
83 Cancri	5½	0.48	1.3	18 10.8	17 25.2	- 8 28.4	-0.6619	0.5632	0.1214	0 -69	
8 Leonis	5½	0.43	1.1	16 56.3	11 1 32.7	- 0 37.8	-0.3930	0.5618	0.1349	+15 -52	
34 Leonis	6½	0.31	0.8	13 54.5	17 14.3	- 9 28.3	+0.4870	0.5586	0.1581	+69 - 5	
37 Leonis	5½	0.29	0.6	14 17.2	19 32.0	- 7 15.4	-0.2774	0.5585	0.1614	+22 -46	
$\iota$ Leonis	5½	-0.14	-0.6	+11 8.3	12 10 28.9	+ 7 11.3	+0.4549	0.5554	-0.1799	+66 - 9	
B. A. C. 3837	6½	-0.01	0.6	8 40.4	21 55.7	- 5 44.8	+0.8896	0.5530	0.1910	+90 +16	
r Virginis	4	+0.16	0.3	7 9.4	13 12 42.8	+ 8 32.8	+0.4605	0.5512	0.2028	+12 -64	
b Virginis	5½	0.24	0.7	4 16.7	19 16.4	- 9 6.6	+1.1610	0.5512	0.2067	+90 +33	
c Virginis	5½	0.35	0.3	3 56.2	11 4 46.8	+ 0 4.9	-0.4769	0.5507	0.2110	+12 -67	
B. A. C. 4251	6	+0.46	-0.4	+ 2 28.3	13 8.5	+ 8 9.9	-0.7491	0.5517	-0.2137	- 4 -88	
80 Virginis	6	0.82	1.3	- 4 49.5	15 15 24.3	+ 9 33.0	+1.0640	0.5562	0.2123	+85 +25	
$\xi^1$ Libræ	6	1.32	1.0	11 26.5	17 2 26.3	- 4 37.8	+0.6336	0.5702	0.1884	+74 - 2	
$\xi^2$ Ceti	5½	1.33	0.7	10 57.5	3 28.6	- 3 37.7	-0.0504	0.5702	0.1884	+30 -10	
17 Libræ	7	1.35	0.7	10 42.2	4 7.7	- 3 0.0	-0.4295	0.5702	0.1876	+10 -61	
18 Libræ	6½	+1.36	-0.6	-10 41.7	4 24.3	- 2 44.0	-0.4899	0.57 2	-0.1871	+ 7 -63	
B. A. C. 5070	6	1.50	+0.1	11 58.1	15 5.1	+ 7 33.7	+1.1410	0.5758	0.1746	-37 -90	
$\gamma$ Libræ	4½	1.58	-0.1	14 24.9	19 58.0	-11 44.2	+0.4823	0.5788	0.1681	+60 -11	
$\eta$ Libræ	6	1.63	-0.1	15 18.9	23 31.8	- 8 18.3	+0.7956	0.5809	0.1628	+75 + 8	
$\theta$ Libræ	4½	1.70	0.0	16 24.0	18 3 34.9	- 4 24.2	+1.2420	0.5830	0.1568	+74 +40	
49 Libræ	6	+1.73	+0.4	-16 12.2	6 19.2	- 1 46.0	+0.6170	0.5834	-0.1523	+68 - 3	
$\gamma$ Ophiuchi	4½	1.88	1.0	18 12.1	17 11.4	+ 8 41.5	+1.0690	0.5891	0.1335	+72 +28	
$\delta$ Ophiuchi	4½	1.88	1.6	16 22.1	18 53.6	+10 19.7	-0.9949	0.5897	0.1301	-31 -80	
24 Scorpii	5½	1.94	1.9	17 31.5	23 5.2	- 9 38.4	-0.3628	0.5920	0.1223	+ 7 -61	
29 Ophiuchi	6½	2.04	2.6	18 43.2	19 7 11.1	- 1 51.3	-0.0853	0.5956	0.1058	+20 -12	
B. A. C. 6098	6	+2.26	+5.2	-20 44.0	20 7 4.4	- 2 54.7	+0.0419	0.6017	-0.0520	+22 -25	
$\alpha$ Sagittarii	4	2.29	5.7	21 5.2	11 24.9	+ 1 15.3	+0.1963	0.6027	0.0411	+29 -26	
14 Sagittarii	6	2.30	5.7	21 44.4	11 35.8	+ 1 25.8	+0.8457	0.6027	0.0407	+68 +13	
15 Sagittarii	5½	2.30	5.8	20 45.5	11 59.2	+ 1 48.3	-0.1578	0.6 29	0.0399	+10 -46	
16 Sagittarii	6½	2.29	5.9	20 25.1	11 59.8	+ 1 48.8	-0.5000	0.6029	0.0399	- 9 -71	
21 Sagittarii	5	+2.31	+6.4	-20 35.9	15 56.6	+ 5 36.1	-0.4580	0.6029	-0.0303	- 7 68	
B. A. C. 6336	6	2.31	6.9	21 29.3	20 49.5	+10 17.3	+0.3193	0.6029	0.0185	+35 -19	
B. A. C. 6347	6	2.31	7.0	21 8.4	21 13.1	+10 40.0	-0.0386	0.6029	0.0175	+14 -38	
29 Sagittarii	5½	2.35	7.6	20 27.0	21 1 26.3	+ 9 16.9	-0.7861	0.6029	0.0071	-28 91	
30 Sagittarii	6½	2.37	7.5	22 17.3	1 51.6	- 8 52.6	+1.0670	0.6029	0.0062	+68 +30	
31 Sagittarii	6½	+2.37	+7.6	-22 3.0	2 22.1	- 8 23.3	+0.8231	0.6027	-0.0050	+68 +14	
33 Sagittarii	6	+2.37	+7.7	21 29.7	3 6.5	- 7 40.7	+0.2609	0.6025	-0.0030	+30 -22	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
$\xi^1$ Sagittarii	5 $\frac{1}{2}$	+2.36	+ 8.0	-20 48.0	21 4 25.7	- 6 24.7	-0.4444	0.6022	+0.0001	-10°	-67°
$\xi^2$ Sagittarii	3 $\frac{1}{2}$	2.36	8.0	21 15.0	4 34.3	- 6 16.5	+0.0101	0.6022	0.0005	+15	-37
$\eta$ Sagittarii	3 $\frac{1}{2}$	2.38	8.3	21 54.2	7 16.6	- 3 40.6	+0.6813	0.6022	0.0069	+63	+ 2
$\pi$ Sagittarii	3	2.37	8.6	21 11.9	9 17.3	- 1 44.7	-0.0135	0.6015	0.0118	+15	-38
50 Sagittarii	6	2.39	9.3	21 59.6	15 47.2	+ 4 29.8	+0.9204	0.5995	0.0275	+68	+18
$f$ Sagittarii	5	+2.37	+10.3	-20 1.6	23 46.8	-11 49.5	-0.7814	0.5974	+0.0463	-24	-90
$\sigma$ Capricorni	5 $\frac{1}{2}$	2.34	11.6	19 27.8	23 13 4.8	+ 0 57.5	-0.5416	0.5909	0.0759	- 8	-75
$\pi$ Capricorni	5	2.32	11.9	18 34.5	16 20.6	+ 4 5.9	-1.1940	0.5895	0.0826	-53	-90
$\nu$ Capricorni	6	2.31	12.0	18 56.9	17 22.8	+ 5 5.7	-0.7235	0.5885	0.0845	-17	-90
$\nu$ Capricorni	5 $\frac{1}{2}$	2.29	12.4	18 31.8	21 34.3	+ 9 7.6	-0.7794	0.5861	0.0937	-20	-90
19 Capricorni	6	+2.27	+13.0	-18 20.6	23 3 43.2	- 8 57.2	-0.3619	0.5828	+0.1054	+ 5	-60
20 Capricorni	6 $\frac{1}{2}$	2.27	13.3	19 27.9	5 43.2	- 7 1.6	+1.0100	0.5818	0.1091	+71	+24
21 Capricorni	6 $\frac{1}{2}$	2.26	13.2	17 57.7	6 16.4	- 6 29.7	-0.4794	0.5813	0.1103	- 1	-69
$\theta$ Capricorni	4	2.25	13.3	17 40.4	8 25.4	- 4 25.5	-0.5360	0.5789	0.1141	- 3	-74
30 Capricorni	5 $\frac{1}{2}$	2.23	13.7	18 27.0	13 31.9	+ 0 29.9	+0.8742	0.5761	0.1233	+71	+14
31 Capricorni	6 $\frac{1}{2}$	+2.22	+13.7	-17 55.7	13 40.3	+ 0 38.0	+0.3518	0.5758	+0.1234	+46	-17
$\gamma$ Capricorni	4 $\frac{1}{2}$	2.21	13.7	17 18.5	15 23.4	+ 2 17.4	-0.0759	0.5740	0.1266	+23	-42
$\gamma$ Capricorni	3 $\frac{1}{2}$	2.16	14.0	17 9.8	23 8.6	+ 9 45.9	+0.8044	0.5686	0.1388	+73	+ 9
45 Capricorni	6 $\frac{1}{2}$	2.14	13.9	15 15.5	24 0 54.2	+11 27.8	-0.9288	0.5678	0.1414	-24	-90
$\delta$ Capricorni	2 $\frac{1}{2}$	2.14	14.1	16 37.9	2 12.4	-11 16.7	+0.6844	0.5665	0.1433	+72	+ 1
$\iota$ Aquarii	4 $\frac{1}{2}$	+2.07	+14.1	-14 24.6	10 54.9	- 2 52.3	-0.3293	0.5605	+0.1552	+13	-57
39 Aquarii	6 $\frac{1}{2}$	2.05	14.3	14 44.5	13 37.7	- 0 15.1	+0.4433	0.5588	0.1590	+57	-13
42 Aquarii	5 $\frac{1}{2}$	2.03	14.2	13 23.1	15 38.2	+ 1 41.4	-0.6561	0.5569	0.1611	- 5	-85
45 Aquarii	6 $\frac{1}{2}$	2.03	14.3	13 51.7	16 38.5	+ 2 39.6	+0.0052	0.5565	0.1623	+32	-37
50 Aquarii	6	2.01	14.4	14 5.7	19 8.5	+ 5 4.5	+0.6604	0.5554	0.1654	+74	- 1
B. A. C. 7835	6 $\frac{1}{2}$	+1.98	+14.4	-13 29.2	21 43.2	+ 7 34.2	+0.4502	0.5529	+0.1679	+59	-12
70 Aquarii	6	1.92	14.1	11 8.6	25 6 24.8	- 8 1.4	-0.5194	0.466	0.1768	+ 5	-71
Lalande 44734	6 $\frac{1}{2}$	1.90	14.0	10 39.1	8 24.9	- 6 5.2	-0.6860	0.5457	0.1784	- 4	-88
74 Aquarii	6	1.90	14.3	12 12.6	8 46.1	- 5 44.7	+1.0280	0.5454	0.1786	+78	+23
$\psi^1$ Aquarii	4	1.82	13.7	9 41.6	19 34.3	+ 4 42.8	+0.3386	0.5384	0.1871	+54	-19
$\chi$ Aquarii	5 $\frac{1}{2}$	+1.82	+13.4	- 8 20.0	20 4.2	+ 5 11.8	-1.0160	0.5390	+0.1873	-24	-90
$\psi^2$ Aquarii	4	1.81	13.8	9 47.5	20 34.6	+ 5 41.2	+0.6313	0.5378	0.1876	+76	- 3
$\psi^3$ Aquarii	4 $\frac{1}{2}$	1.81	13.9	10 13.2	21 5.5	+ 6 11.2	+1.1830	0.5374	0.1878	+80	+37
B. A. C. 8274	7	1.68	12.7	6 59.9	26 11 47.9	- 3 33.7	+0.5797	0.5301	0.1937	+74	- 6
14 Ceti	6	1.49	10.2	1 7.1	27 11 55.2	- 4 9.4	-0.9727	0.5196	0.2011	-18	-90
15 Ceti	6 $\frac{1}{2}$	+1.46	+10.2	- 1 7.1	13 15.1	- 2 51.8	-0.7052	0.5189	+0.2011	- 1	-90
26 Ceti	6	1.36	9.1	+ 0 46.2	28 2 46.2	+10 15.7	-0.0455	0.5159	0.2004	+35	-39
29 Ceti	6 $\frac{1}{2}$	1.34	8.8	1 24.6	4 58.5	-11 35.7	-0.3042	0.5159	0.2002	+20	-55
33 Ceti	6	1.33	8.7	1 51.1	6 20.4	-10 16.2	-0.5154	0.5153	0.1998	+ 9	-70
35 Ceti	6 $\frac{1}{2}$	1.32	8.7	1 52.9	7 23.1	- 9 15.3	-0.3370	0.5150	0.1997	+19	-57
$f$ Piscium	5	+1.30	+ 8.1	+ 3 1.6	10 10.5	- 6 32.7	-1.0370	0.5150	+0.1991	-23	-87
$\nu$ Piscium	4 $\frac{1}{2}$	1.19	6.8	4 55.3	22 43.9	+ 5 39.2	-0.6393	0.5139	0.1953	+ 2	-80
64 Ceti	5 $\frac{1}{2}$	1.07	4.9	8 2.8	29 14 38.2	- 2 53.7	-1.0330	0.5144	0.1879	+23	-82
$\xi^1$ Ceti	4 $\frac{1}{2}$	1.07	4.7	8 19.4	15 30.1	- 2 3.3	-1.1770	0.5144	0.1874	-35	-82
$\xi^2$ Ceti	4 $\frac{1}{2}$	0.99	4.3	7 57.6	23 32.5	+ 5 45.3	+0.7129	0.5154	0.1825	+90	+ 4
B. A. C. 830	6	+0.93	+ 3.1	+10 15.9	30 7 4.4	-10 55.9	-0.4807	0.5162	+0.1770	+11	-64
$\alpha$ Ceti	4 $\frac{1}{2}$	0.92	3.2	9 38.5	8 21.4	- 9 41.1	+0.4347	0.5165	0.1762	+64	-10
Lalande 5725	6	0.84	1.5	12 45.5	19 33.1	+ 1 11.2	-1.0920	0.5200	0.1670	-28	-77
$f$ Tauri	4	+0.71	+ 0.9	+12 33.1	31 8 11.9	-10 32.3	+1.1730	0.5236	+0.1550	+90	+40

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B. A. C. 1272	6	+0.56   - 1.5	+17 2.4	1 2 53.6	+ 7 35.4	-1.0900	0.5311	+0.1334	-30	-73
$\delta^1$ Tauri	4	0.49   1.8	17 16.8	10 17.8	- 9 14.0	-0.4026	0.5338	0.1240	+15	-52
63 Tauri	6	0.48   1.7	16 30.8	10 33.0	- 8 59.3	+0.4743	0.5339	0.1232	+68	- 2
$\delta^2$ Tauri	5 $\frac{1}{2}$	+0.48   - 1.9	+17 11.0	10 52.3	- 8 40.6	-0.2243	0.5342	+0.1230	+25	-40
$\delta^3$ Tauri	5	+0.48   - 2.0	+17 40.2	11 32.9	- 8 1.3	-0.6784	0.5347	+0.1219	- 1	-71

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

AUGUST.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
75 Tauri	6 $\frac{1}{2}$	+0.45	-1.6	+16 6.5	1 13 2.2	- 6 34.7	+1.2250	0.5353	+0.1198	+90	+51
B. A. C. 1468	6 $\frac{1}{2}$	0.38	2.7	18 31.8	21 41.0	+ 1 47.8	-0.4606	0.5394	0.1077	+11	-53
i Tauri	5 $\frac{1}{2}$	0.36	2.8	18 38.9	2 0 8.6	+ 4 10.7	-0.3285	0.5411	0.1042	+19	-44
m Tauri	5 $\frac{1}{2}$	0.29	3.0	18 29.5	7 49.4	+11 36.8	+0.5971	0.5448	0.0922	+80	+ 9
z Tauri	3 $\frac{1}{2}$	0.16	4.0	21 4.3	22 1.6	+ 1 21.1	-1.0870	0.5503	0.0684	-32	-69
$\chi^1$ Orionis	4 $\frac{1}{2}$	+0.09	-4.0	+20 15.1	3 5 48.7	+ 8 52.7	+0.2873	0.5535	+0.0545	+56	- 5
$\chi^2$ Orionis	6	0.09	3.8	19 43.4	6 4.3	+ 9 7.8	+0.8784	0.5535	0.0541	+90	+29
$\chi^3$ Orionis	6	0.05	3.8	19 41.4	9 58.8	-11 5.5	+1.1130	0.5558	0.0470	+90	+46
$\chi^4$ Orionis	5	0.05	3.9	20 8.3	10 11.0	-10 53.8	+0.6316	0.5560	0.0466	+85	+15
68 Orionis	6	+0.02	3.9	19 48.8	13 53.6	- 7 18.7	+1.1450	0.5569	0.0397	+90	+33
15 Geminorum	6 $\frac{1}{2}$	-0.03	-4.2	+20 51.4	21 1.2	- 0 25.6	+0.2441	0.5605	+0.0260	+52	- 4
16 Geminorum	6 $\frac{1}{2}$	0.03	4.1	20 33.7	21 6.1	- 0 20.9	+0.5659	0.5605	0.0258	+78	+13
v Geminorum	4 $\frac{1}{2}$	0.03	4.0	20 16.8	21 34.1	+ 0 6.2	+0.8327	0.5605	0.0249	+90	+34
d Geminorum	6	0.12	4.3	21 53.5	4 7 40.5	+ 9 51.8	-0.7103	0.5630	+0.0052	- 4	-67
z Geminor. mult.	4	0.15	4.0	20 43.9	13 18.0	- 8 42.6	+0.5386	0.5650	-0.0063	+75	-14
d Geminorum	3 $\frac{1}{2}$	-0.20	-4.1	+22 11.2	20 22.0	- 1 53.4	-1.1190	0.5665	-0.0204	-36	-68
56 Geminorum	5 $\frac{1}{2}$	0.19	3.8	20 39.2	21 12.5	- 1 4.6	+0.5081	0.5669	0.0219	+72	+11
61 Geminorum	6	0.21	3.7	20 28.7	23 24.8	+ 1 3.1	+0.6421	0.5680	0.0268	+87	+1
63 Geminorum	5 $\frac{1}{2}$	0.22	3.9	21 40.2	23 44.7	+ 1 22.2	-0.6459	0.5680	0.0276	0	-60
79 Geminorum	6 $\frac{1}{2}$	0.26	3.6	20 35.0	5 7 26.2	+ 8 47.4	+0.2481	0.5684	0.0435	+52	- 7
85 Geminorum	6	-0.28	-3.4	+20 10.6	12 4.8	-10 43.6	+0.4582	0.5689	-0.0524	+68	+ 5
MERCURY				20 42.7	15 43.1	- 7 13.1	-0.3168	0.3918	0.0488	+19	-39
SATURN				18 11.5	6 16 20.3	- 7 28.1	+0.2807	0.5556	0.0391	+52	- 3
NEW MOON.											
VENUS				+14 55.0	7 15 31.7	- 9 5.6	+0.7374	0.4408	-0.1040	+90	+13
B. A. C. 3837	6 $\frac{1}{2}$	-0.14	0.0	8 40.4	9 4 13.3	+ 2 20.3	+0.8646	0.5598	0.1936	+90	+14
v Virginis	4	-0.03	+0.6	7 9.4	18 43.9	- 7 38.6	-0.4795	0.5571	0.2051	+11	-66
b Virginis	5 $\frac{1}{2}$	+0.04	0.3	4 16.7	10 1 10.8	- 1 24.8	+1.1280	0.5565	0.2090	+90	+31
c Virginis	5 $\frac{1}{2}$	0.11	0.7	3 56.2	10 32.5	+ 7 38.0	-0.5017	0.5560	0.2133	+10	-68
B. A. C. 4254	6	+0.19	+0.8	+ 2 28.3	18 47.4	- 8 23.8	-0.7758	0.5558	-0.2155	- 5	-74
80 Virginis	6	0.50	0.4	- 4 49.5	11 20 49.3	- 7 14.6	+1.0290	0.5583	0.2137	+85	+22
88 Virginis	6 $\frac{1}{2}$	0.57	0.2	6 16.7	19 2 35.5	- 1 40.2	+1.2750	0.5593	0.2111	+84	+46
$\xi^1$ Libræ	6	0.97	0.3	11 26.5	13 7 55.4	+ 2 38.6	+0.5953	0.5670	0.1887	+71	- 5
$\xi^2$ Libræ	5 $\frac{1}{2}$	0.99	0.6	10 57.5	8 58.2	+ 3 39.2	-0.0894	0.5675	0.1875	+28	-42
17 Libræ	7	+0.99	+0.7	-10 42.2	9 37.6	+ 4 17.2	-0.4706	0.5675	-0.1868	+ 8	-67
18 Libræ	6 $\frac{1}{2}$	0.99	0.7	10 41.7	9 54.4	+ 4 33.5	-0.5313	0.5678	0.1866	+ 5	-72
B. A. C. 5070	6	1.15	1.2	11 58.1	20 42.1	- 9 2.0	-1.1875	0.5722	0.1736	-41	-90
$\gamma$ Libræ	4 $\frac{1}{2}$	1.23	0.8	14 24.9	14 1 39.1	- 4 15.7	+0.4453	0.5740	0.1668	+58	-12
$\eta$ Libræ	6	1.28	0.7	15 18.9	5 17.0	- 0 45.7	+0.7590	0.5758	0.1615	+75	+ 6
$\theta$ Libræ	4 $\frac{1}{2}$	+1.34	+0.7	-16 24.0	9 23.2	+ 3 11.5	+1.2120	0.5773	-0.1553	+75	+42
49 Libræ	6	1.39	1.0	16 12.2	12 10.2	+ 5 52.4	+0.5818	0.5782	0.1509	+66	- 5
$\chi$ Ophiuchi	4 $\frac{1}{2}$	1.56	1.3	18 12.1	23 14.9	- 7 27.6	+1.0420	0.5829	0.1320	+72	+26
$\phi$ Ophiuchi	4 $\frac{1}{2}$	1.57	2.2	16 22.1	15 0 59.3	- 5 47.1	-1.0440	0.5835	0.1287	-34	-90
24 Scorpii	5 $\frac{1}{2}$	1.64	2.2	17 31.5	5 16.4	- 1 39.7	-0.4036	0.5849	0.1208	+ 5	-63
29 Ophiuchi	6 $\frac{1}{2}$	+1.75	+2.7	-18 43.2	13 33.2	+ 6 18.3	-0.1250	0.5876	-0.1037	+17	-44
B. A. C. 6098	6	2.06	4.8	20 44.0	16 14 2.3	+ 5 50.8	+0.0102	0.5936	0.0508	+20	-36
$\mu$ Sagittarii	4	2.12	5.2	21 5.2	18 29.6	+10 7.6	+0.1681	0.5944	0.0403	+28	-27
14 Sagittarii	6	2.13	5.1	21 44.4	18 40.8	+10 18.4	+0.8268	0.5944	0.0401	+68	+12
15 Sagittarii	5 $\frac{1}{2}$	2.12	5.4	20 45.5	19 4.8	+10 41.5	-0.1901	0.5944	0.0394	+ 8	-49
16 Sagittarii	6 $\frac{1}{2}$	+2.12	+5.6	-20 25.1	19 5.3	+10 42.0	-0.5364	0.5944	-0.0391	-11	-75
21 Sagittarii	5	2.16	5.0	20 36.1	23 8.3	- 9 24.5	-0.4889	0.5942	0.0301	- 9	-70
B. A. C. 6336	6	2.22	6.4	21 29.3	17 4 8.6	- 4 35.9	+0.2976	0.5942	0.0178	+33	-80
B. A. C. 6347	6	2.22	6.5	21 8.4	4 32.8	- 4 12.6	-0.0663	0.5942	0.0166	+13	-41
29 Sagittarii	5 $\frac{1}{2}$	2.25	7.2	20 27.0	8 52.4	- 0 3.1	-0.8213	0.5939	0.0068	-30	-90
30 Sagittarii	6 $\frac{1}{2}$	+2.28	+6.9	-22 17.3	9 18.4	+ 0 21.8	+1.0520	0.5939	-0.0059	+68	+29
31 Sagittarii	6 $\frac{1}{2}$	+2.28	+7.0	-22 3.0	9 49.7	+ 0 51.9	+0.8060	0.5938	-0.0044	+68	+10

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
33 Sagittarii	6	+2.28	+7.2	-21° 29.7	17 10 35.3	+ 1 35.8	+0.2368	0.5938	-0.0026	+28	-23
$\xi^1$ Sagittarii	5 $\frac{1}{2}$	2.29	7.5	20 48.0	11 56.4	+ 2 53.7	-0.4735	0.5938	+0.0005	-11	-69
$\xi^2$ Sagittarii	3 $\frac{1}{2}$	2.29	7.5	21 15.0	12 5.2	+ 3 2.1	-0.0136	0.5938	0.0007	+14	-38
$\sigma$ Sagittarii	3 $\frac{1}{2}$	2.32	7.7	21 54.2	14 51.7	+ 5 42.2	+0.6659	0.5934	0.0073	+62	+ 1
$\pi$ Sagittarii	3	2.33	8.1	21 11.9	16 55.2	+ 7 40.9	-0.0358	0.5934	0.0121	+14	-39
50 Sagittarii	6	+2.38	+ 8.7	-21 59.7	23 34.5	- 9 55.2	+0.9128	0.5919	+0.0280	+68	+18
$f$ Sagittarii	5	2.40	10.0	20 1.6	18 7 45.0	- 2 3.6	-0.8029	0.5905	0.0463	-25	-90
$\sigma$ Capricorni	5 $\frac{1}{2}$	2.46	11.5	19 27.8	21 19.4	+11 0.0	-0.5550	0.5849	0.0757	- 8	-76
$\pi$ Capricorni	5	2.46	12.0	18 34.5	19 0 38.0	- 9 48.9	-1.2120	0.5838	0.0825	-55	-90
$\sigma$ Capricorni	6	2.47	12.1	18 56.9	1 42.2	- 8 47.0	-0.7365	0.5831	0.0848	-18	-90
$\nu$ Capricorni	5 $\frac{1}{2}$	+2.47	+12.5	-18 31.8	5 58.1	- 4 40.7	-0.7896	0.5815	+0.0933	-21	-90
19 Capricorni	6	2.48	13.1	18 20.6	12 12.8	+ 1 20.2	-0.3643	0.5778	0.1050	+ 5	-60
20 Capricorni	6 $\frac{1}{2}$	2.49	13.1	19 27.9	14 14.5	+ 3 17.5	+1.0190	0.5775	0.1090	+71	+25
21 Capricorni	6 $\frac{1}{2}$	2.48	13.3	17 57.7	14 48.4	+ 3 50.2	-0.4809	0.5771	0.1103	- 1	-69
$\theta$ Capricorni	4	2.47	13.6	17 40.4	16 59.0	+ 5 56.0	-0.5346	0.5753	0.1142	- 3	-74
30 Capricorni	5 $\frac{1}{2}$	+2.48	+13.8	-18 27.0	22 9.7	+10 55.5	+0.8855	0.5722	+0.1230	+72	+14
31 Capricorni	6 $\frac{1}{2}$	2.48	13.8	17 55.7	22 18.1	+11 3.7	+0.3604	0.5719	0.1232	+47	-17
$\iota$ Capricorni	4 $\frac{1}{2}$	2.47	14.0	17 18.5	20 0 2.6	-11 15.5	-0.0677	0.5715	0.1264	+23	-41
$\gamma$ Capricorni	3 $\frac{1}{2}$	2.46	14.6	17 9.8	7 52.7	- 3 42.1	+0.8239	0.5672	0.1390	+73	+10
45 Capricorni	6 $\frac{1}{2}$	2.44	14.8	15 15.5	9 39.2	- 1 59.3	-0.9181	0.5658	0.1417	-23	-90
$\delta$ Capricorni	2 $\frac{1}{2}$	+2.45	+14.8	-16 37.9	10 58.2	- 0 43.1	+0.7055	0.5646	+0.1435	+73	+ 2
$\iota$ Aquarii	4 $\frac{1}{2}$	2.43	15.3	14 24.5	19 44.3	+ 7 45.0	-0.3112	0.5595	0.1556	+13	-56
39 Aquarii	6 $\frac{1}{2}$	2.43	15.4	14 44.4	22 28.2	+10 23.3	+0.4675	0.5578	0.1593	+59	-11
42 Aquarii	5 $\frac{1}{2}$	2.41	15.5	13 23.0	21 0 29.2	-11 39.7	-0.6356	0.5560	0.1616	- 4	-83
45 Aquarii	6 $\frac{1}{2}$	2.41	15.6	13 51.6	1 29.7	-10 41.3	+0.0298	0.5551	0.1627	+33	-35
50 Aquarii	6	+2.41	+15.7	-14 5.6	4 0.3	- 8 15.8	+0.6877	0.5542	+0.1659	+75	+ 1
B. A. C. 7835	6 $\frac{1}{2}$	2.39	15.8	13 29.1	6 35.5	- 5 45.6	+0.4815	0.5529	0.1688	+62	-11
70 Aquarii	6	2.36	16.0	11 8.5	15 18.0	+ 2 39.7	-0.4868	0.5478	0.1774	+ 7	-68
Lalande 44734	6 $\frac{1}{2}$	2.36	16.0	10 39.0	17 18.4	+ 4 36.2	-0.6483	0.5469	0.1795	- 2	-84
74 Aquarii	6	2.36	16.1	12 12.5	17 39.5	+ 4 56.6	+1.0660	0.5465	0.1799	+78	+26
$\psi^1$ Aquarii	4	+2.31	+16.1	- 9 41.5	22 4 26.9	- 8 36.6	+0.3837	0.5409	+0.1887	+58	-16
$\chi$ Aquarii	5 $\frac{1}{2}$	2.31	16.0	8 19.9	4 56.7	- 8 7.8	-0.9716	0.5408	0.1888	-22	-90
$\psi^2$ Aquarii	4	2.31	16.1	9 47.4	5 27.0	- 7 38.5	+0.6769	0.5400	0.1892	+79	0
$\psi^3$ Aquarii	4 $\frac{1}{2}$	2.30	16.2	10 13.1	5 57.8	- 7 8.6	+1.2330	0.5399	0.1894	+80	+42
B. A. C. 8274	7	2.23	15.7	6 59.8	20 36.6	+ 7 2.9	+0.6304	0.5320	0.1972	+78	- 3
14 Ceti	6	+2.12	+14.2	- 1 7.1	23 20 33.3	+ 6 16.5	-0.8841	0.5176	+0.2004	-12	-90
15 Ceti	6 $\frac{1}{2}$	2.11	14.0	- 1 7.1	21 52.5	+ 7 33.5	-0.6209	0.5178	0.2008	+ 3	-80
26 Ceti	6	2.04	13.0	+ 0 46.2	24 11 16.4	- 3 26.2	+0.0417	0.5195	0.2024	+40	-34
29 Ceti	6 $\frac{1}{2}$	2.02	12.8	1 24.7	13 27.5	- 1 18.9	-0.2164	0.5195	0.2022	+25	-50
33 Ceti	6	2.02	12.6	1 51.2	14 48.6	- 0 0.1	-0.4255	0.5190	0.2018	+14	-63
35 Ceti	6 $\frac{1}{2}$	+2.01	+12.5	+ 1 53.0	15 51.0	+ 1 0.4	-0.2491	0.5186	+0.2016	+23	-52
$f$ Piscium	5	2.00	12.1	3 1.7	18 36.9	+ 3 41.6	-0.9453	0.5186	0.2011	-16	-87
$\nu$ Piscium	4 $\frac{1}{2}$	1.93	10.9	4 55.4	25 7 3.8	- 8 13.1	-0.5394	0.5175	0.1971	+ 8	-71
64 Ceti	5 $\frac{1}{2}$	1.84	9.0	8 2.9	22 51.0	+ 7 7.0	-0.9266	0.5165	0.1892	-15	-82
$\xi^1$ Ceti	4 $\frac{1}{2}$	1.84	8.9	8 19.4	23 42.6	+ 7 56.9	-1.0670	0.5165	0.1887	-25	-82
$\xi^2$ Ceti	4 $\frac{1}{2}$	+1.77	+ 8.5	+ 7 57.6	26 7 42.1	- 8 17.3	+0.8218	0.5171	+0.1835	+90	+11
B. A. C. 830	6	1.73	7.2	10 15.9	15 11.9	- 1 0.6	-0.3684	0.5184	0.1781	+17	-57
$\mu$ Ceti	4 $\frac{1}{2}$	1.71	7.3	9 38.5	16 28.5	+ 0 13.8	+0.5451	0.5183	0.1770	+73	- 5
Lalande 5725	6	1.65	5.5	12 45.6	27 3 38.1	+11 3.9	-0.9779	0.5205	0.1675	-19	-77
$f$ Tauri	4	1.53	4.6	12 33.2	16 16.3	- 0 40.3	+1.2900	0.5234	0.1550	+90	+56
B. A. C. 1272	6	+1.38	+ 1.6	+17 2.4	28 11 0.0	- 6 30.4	-0.9743	0.5314	+0.1330	-20	-73
$\delta^1$ Tauri	4	1.32	1.0	17 16.8	18 26.2	+ 0 42.1	-0.2874	0.5319	0.1230	+21	-44
63 Tauri	6	1.31	1.2	16 30.8	18 41.5	+ 0 57.0	+0.5913	0.5322	0.1228	+79	+ 5
$\delta^2$ Tauri	5 $\frac{1}{2}$	1.31	1.0	17 11.0	19 0.7	+ 1 15.6	-0.1086	0.5323	0.1225	+31	-33
$\delta^3$ Tauri	5	1.31	+ 0.8	17 40.2	19 41.5	+ 1 55.1	-0.5636	0.5326	0.1215	+ 6	-62
B. A. C. 1468	6 $\frac{1}{2}$	+1.21	- 0.2	+18 31.8	29 5 53.3	+11 47.8	-0.3456	0.5366	+0.1070	+18	-45
$\iota$ Tauri	5 $\frac{1}{2}$	+1.19	- 0.4	+18 38.9	8 21.8	- 9 48.3	-0.2169	0.5376	+0.1035	+25	-37



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Magn.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N. S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m				
$\alpha$ Tauri	5 $\frac{1}{2}$	+1.10	-0.8	+18 29.6	29 16 6.1	- 2 18.7	+0.7082	0.5409	+0.0913	+90 +15
$\beta$ Tauri	5 $\frac{1}{2}$	1.12	1.4	20 16.2	16 15.7	- 2 9.4	-1.2330	0.5412	0.0910	-49 -70
$\gamma$ Tauri	3 $\frac{1}{2}$	0.96	2.5	21 4.4	30 6 25.4	+11 32.7	-0.9854	0.5471	0.0674	-23 -69
$\chi$ Orionis	4 $\frac{1}{2}$	0.87	2.6	20 15.2	14 16.8	- 4 51.4	+0.3916	0.5496	0.0539	+62 +1
$\lambda$ Orionis	6	0.86	2.4	19 43.5	14 32.5	- 4 36.1	+0.9800	0.5496	0.0532	+90 +36
$\kappa$ Orionis	6	+0.82	-2.6	+19 41.5	18 29.2	- 0 47.3	+1.2110	0.5514	+0.0460	+90 +52
$\lambda$ Orionis	5	0.82	2.8	20 8.4	18 41.5	- 0 35.5	+0.7323	0.5514	0.0456	+90 +22
$\mu$ Orionis	6	0.78	2.8	19 48.9	22 26.2	+ 3 1.8	+1.2470	0.5545	0.0388	+90 +64
15 Geminorum	6 $\frac{1}{2}$	0.70	3.5	20 51.4	31 5 37.8	+ 9 58.8	+0.3406	0.5558	0.0252	+60 +1
16 Geminorum	6 $\frac{1}{2}$	0.70	3.4	20 33.7	5 42.8	+10 3.6	+0.6630	0.5558	0.0252	+90 +19
$\nu$ Geminorum	4 $\frac{1}{2}$	+0.69	-3.4	+20 16.8	6 10.9	+10 30.8	+0.9800	0.5560	+0.0244	+90 +39
$\delta$ Geminorum	6	0.59	4.3	21 53.5	16 22.8	- 3 38.1	-0.6233	0.5593	+0.0047	+1 -57
$\zeta$ Geminor. <i>mult.</i>	4	+0.52	-4.1	+20 43.9	22 3.0	+1 50.3	+0.6240	0.5614	-0.0068	+85 +18

SEPTEMBER.

$\delta$ Geminorum	3 $\frac{1}{2}$	+0.46	-4.6	+22 11.2	1 5 10.5	+ 8 43.1	-1.0430	0.5632	-0.0211	-28 -68
56 Geminorum	5 $\frac{1}{2}$	0.44	4.1	20 39.2	6 1.3	+ 9 32.1	+0.5878	0.5637	0.0214	+80 +15
61 Geminorum	6	0.42	4.1	20 28.7	8 14.5	+11 40.7	+0.7191	0.5636	0.0272	+90 +22
63 Geminorum	5 $\frac{1}{2}$	0.42	4.5	21 40.2	8 34.4	+11 59.8	-0.5706	0.5639	0.0277	+ 4 -53
79 Geminorum	6 $\frac{1}{2}$	+0.34	-4.2	+20 35.0	16 18.7	- 4 32.1	+0.3168	0.5648	-0.0434	+57 - 2
85 Geminorum	6	0.29	4.2	20 10.6	20 57.9	- 0 2.6	+0.5256	0.5661	0.0531	+74 + 9
B. A. C 2788	6	0.20	4.3	21 5.9	2 7 48.3	+10 24.9	-1.1470	0.5678	0.0748	-38 -69
$\theta$ Cancri	5 $\frac{1}{2}$	0.15	3.6	18 28.2	12 47.9	- 7 46.1	+1.2380	0.5688	0.0847	+90 +58
35 Cancri	6 $\frac{1}{2}$	0.14	4.0	19 58.4	14 24.3	- 7 13.1	-0.4895	0.5688	0.0880	+10 -54
39 Cancri	6 $\frac{1}{2}$	+0.12	-3.9	+20 24.1	16 29.9	- 5 12.0	-1.1280	0.5684	-0.0919	-35 -70
40 Cancri	6 $\frac{1}{2}$	0.12	4.0	20 21.9	16 32.1	- 5 9.9	-1.0910	0.5684	0.0923	-31 -70
$\epsilon$ Cancri	6 $\frac{1}{2}$	0.12	3.9	19 56.5	16 39.2	- 5 3.0	-0.6572	0.5684	0.0925	0 -66
$\delta$ Cancri	4	0.11	3.6	18 33.8	18 32.1	- 3 14.0	+0.6176	0.5682	0.0955	+83 +10
80 Cancri	6 $\frac{1}{2}$	0.02	3.3	18 30.1	3 6 29.5	+ 8 17.9	-0.5969	0.5690	0.1188	+ 4 -64
SATURN				+17 15.8	7 22.6	+ 9 9.1	+0.5932	0.5567	-0.0390	+78 + 6
83 Cancri	5 $\frac{1}{2}$	+0.01	-3.1	18 10.7	9 35.2	+11 17.1	-0.6342	0.5688	0.1241	+ 2 -67
8 Leonis	5 $\frac{1}{2}$	-0.03	-2.7	+16 56.3	17 31.9	- 5 3.1	-0.3779	0.5682	0.1378	+16 -50
NEW MOON.										
80 Virginis	6	+0.22	+1.2	- 4 49.5	8 3 34.6	+ 1 18.2	+0.8978	0.5674	-0.2176	+85 +13
88 Virginis	6 $\frac{1}{2}$	0.28	1.2	6 16.7	9 12.3	+ 6 44.2	+1.1390	0.5671	0.2151	+84 +31
$\xi$ Libræ	6	0.57	1.4	11 26.5	9 13 53.2	+10 23.9	+0.4447	0.5731	0.1913	+60 -13
$\zeta$ Libræ	5 $\frac{1}{2}$	0.58	1.7	10 57.5	14 54.8	+11 23.3	-0.2374	0.5732	0.1901	+21 -51
17 Libræ	7	0.59	1.7	10 42.2	15 33.3	-11 59.6	-0.6137	0.5735	0.1893	0 -80
18 Libræ	6 $\frac{1}{2}$	+0.59	+1.8	-10 41.7	15 50.0	-11 43.5	-0.6739	0.5733	-0.1890	- 4 -87
$\gamma$ Libræ	4 $\frac{1}{2}$	0.80	1.7	14 24.9	10 7 19.3	+ 3 11.8	+0.2864	0.5780	0.1633	+46 -21
$\eta$ Libræ	6	0.84	1.7	15 18.9	10 54.3	+ 6 38.9	+0.5989	0.5797	0.1629	+69 - 4
$\theta$ Libræ	4 $\frac{1}{2}$	0.90	1.7	16 24.0	14 57.5	+10 33.2	+1.0440	0.5807	0.1562	+74 +25
40 Libræ	6	0.93	1.9	16 12.2	17 42.7	-10 47.7	+0.4235	0.5817	0.1519	+54 -14
$\chi$ Ophiuchi	4 $\frac{1}{2}$	+1.10	+2.0	-18 12.1	11 4 41.9	- 0 13.2	+0.8786	0.5839	-0.1323	+72 +14
$\phi$ Ophiuchi	4 $\frac{1}{2}$	1.11	2.8	16 22.1	6 25.7	+ 1 26.6	-1.2000	0.5845	0.1287	-49 -90
24 Scorpii	5 $\frac{1}{2}$	1.17	2.4	17 31.5	10 41.3	+ 5 32.5	-0.5615	0.5858	0.1208	- 5 -76
29 Ophiuchi	6 $\frac{1}{2}$	1.30	3.0	18 43.2	18 57.1	-10 30.5	-0.2821	0.5879	0.1041	+ 9 -55
$\epsilon$ Ophiuchi	5	1.39	2.9	20 59.5	12 2 40.4	- 3 4.9	+1.2830	0.5891	0.0775	+63 +63
58 Ophiuchi	5 $\frac{1}{2}$	+1.55	+3.6	-21 37.6	11 45.3	+ 5 39.1	+1.2270	0.5903	-0.0676	+68 +41
B. A. C. 6098	6	1.64	4.6	20 44.0	19 31.0	-10 53.2	-0.1377	0.5903	0.0498	+12 -46
$\mu$ Sagittarii	4	1.69	4.9	21 5.2	13 0 0.5	- 6 34.1	-0.0170	0.5905	0.0384	+17 -33
14 Sagittarii	6	1.70	5.2	21 44.4	0 11.9	- 6 23.1	+0.6797	0.5906	0.0384	+64 + 2
15 Sagittarii	5 $\frac{1}{2}$	1.70	5.1	20 45.5	0 36.1	- 5 59.9	-0.3373	0.5906	0.0384	0 -59
16 Sagittarii	6 $\frac{1}{2}$	+1.70	+5.2	-20 25.1	0 36.6	- 5 59.5	-0.6849	0.5906	-0.0384	-19 -90
21 Sagittarii	5	+1.75	+5.5	-20 35.9	4 42.0	- 2 3.5	-0.6398	0.5907	-0.0287	-17 -86

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.	
		$\Delta\alpha$ s	$\Delta\delta$ "	d h m	h m						
B. A. C. 6336	6	+1.82	+5.7	-21 29.3	13 9 45.7	+2 48.6	+0.1552	0.5893	-0.0171	+25 -28	
B. A. C. 6347	6	1.82	5.9	21 8.4	10 10.2	+3 12.1	-0.2085	0.5905	0.0164	+5 -50	
28 Sagittarii	5½	1.87	5.7	22 30.4	13 9.4	+6 4.6	+1.1540	0.5891	0.0094	+67 +39	
29 Sagittarii	5½	1.87	6.5	20 27.0	14 33.0	+7 24.9	-0.9640	0.5889	0.0058	-40 -90	
30 Sagittarii	6½	1.89	6.0	22 17.3	14 59.4	+7 50.2	+0.9210	0.5897	0.0050	+68 +18	
31 Sagittarii	6½	+1.90	+6.1	-22 3.0	15 31.1	+8 20.7	+0.6728	0.5893	-0.0036	+62 +2	
33 Sagittarii	6	1.90	6.4	21 29.7	16 17.2	+9 5.0	+0.0993	0.5891	-0.0021	+21 -32	
ξ Sagittarii	5½	1.91	6.7	20 43.0	17 39.6	+10 24.3	-0.6130	0.5887	+0.0009	-18 -83	
ξ Sagittarii	3½	1.92	6.5	21 15.0	17 43.5	+10 32.8	-0.1507	0.5887	0.0014	+7 -46	
ο Sagittarii	3½	1.96	6.6	21 54.2	20 37.4	-10 44.7	+0.5352	0.5885	0.0082	+49 -7	
π Sagittarii	3	+1.97	+7.1	-21 11.9	22 42.6	-8 44.3	-0.1698	0.5879	+0.0129	+7 -48	
50 Sagittarii	6	2.06	7.6	21 59.7	14 5 28.2	-2 14.1	+0.7903	0.5858	0.0282	+68 +9	
f Sagittarii	5	2.12	9.1	20 1.6	13 47.1	+5 46.0	-0.9292	0.5837	0.0466	-33 -90	
σ Capricorni	5½	2.23	10.5	19 27.8	15 3 36.8	-4 55.1	-0.6673	0.5784	0.0763	-14 -90	
ο Capricorni	6	2.26	10.9	18 56.9	8 4.8	-0 36.9	-0.8437	0.5767	0.0850	-23 -90	
ν Capricorni	5½	+2.30	+11.5	-18 31.8	12 25.7	+3 34.4	-0.8923	0.5736	+0.0936	-27 -90	
19 Capricorni	6	2.34	11.9	18 20.6	18 47.9	+9 43.0	-0.4547	0.5715	0.1052	+1 -67	
20 Capricorni	6½	2.36	11.9	19 27.9	20 52.1	+11 42.7	+0.9388	0.5698	0.1090	+71 +13	
21 Capricorni	6½	2.35	12.3	17 57.7	21 26.5	-11 44.2	-0.5697	0.5693	0.1101	-6 -77	
θ Capricorni	4	2.37	12.5	17 40.4	23 39.8	-9 35.6	-0.6230	0.5689	0.1139	-9 -83	
30 Capricorni	5½	+2.40	+12.8	-18 27.0	16 4 56.6	-4 30.0	+0.8198	0.5658	+0.1231	+72 +10	
31 Capricorni	6½	2.39	12.9	17 55.7	5 5.0	-4 21.9	+0.2884	0.5657	0.1234	+42 -21	
ι Capricorni	4½	2.40	13.1	17 18.5	6 51.6	-2 39.0	-0.1399	0.5644	0.1262	-20 -45	
γ Capricorni	3½	2.43	13.7	17 9.8	14 50.6	+5 3.4	+0.7684	0.5607	0.1390	+73 +6	
45 Capricorni	6½	2.43	14.2	15 15.5	16 39.2	+6 48.3	-0.9861	0.5604	0.1417	-28 -90	
δ Capricorni	2½	+2.44	+14.0	-16 37.9	17 59.5	+8 5.8	+0.6556	0.5595	+0.1436	+70 -1	
ι Aquarii	4½	2.46	14.9	14 24.6	17 2 55.2	-7 16.5	-0.3544	0.5547	0.1560	+11 -59	
39 Aquarii	6½	2.47	14.9	14 44.5	5 41.8	-4 35.4	+0.4338	0.5522	0.1591	+57 -13	
42 Aquarii	5½	2.47	15.3	13 23.0	7 45.1	-2 36.2	-0.6732	0.5520	0.1618	-6 -88	
45 Aquarii	6½	2.47	15.3	13 51.6	8 46.5	-1 36.8	-0.0018	0.5511	0.1631	+31 -37	
50 Aquarii	6	+2.48	+15.4	-14 5.6	11 19.5	+0 51.1	+0.6661	0.5492	+0.1658	+74 0	
B. A. C. 7835	6½	2.48	15.6	13 29.1	13 57.2	+3 23.7	+0.4584	0.5482	0.1690	+59 -12	
70 Aquarii	6	2.50	16.1	11 8.5	22 47.4	+11 56.8	-0.4972	0.5440	0.1780	+7 -70	
Lalande 44734	6½	2.50	16.1	10 39.0	18 0 49.3	-10 5.2	-0.6589	0.5424	0.1798	-3 -85	
74 Aquarii	6	2.51	16.1	12 12.5	1 10.7	-9 44.5	+1.0660	0.5421	0.1801	+78 +26	
ψ Aquarii	4	+2.52	+16.4	-9 41.5	12 6.1	+0 50.3	+0.4011	0.5367	+0.1890	+59 -15	
χ Aquarii	5½	2.52	16.5	8 19.9	12 36.2	+1 19.5	-0.9607	0.5365	0.1891	-20 -90	
ψ Aquarii	4	2.52	16.5	9 47.4	13 6.9	+1 49.1	+0.6969	0.5360	0.1895	+80 +1	
ψ Aquarii	4½	2.52	16.6	10 13.1	13 37.8	+2 19.1	+1.2510	0.5360	0.1899	+80 +44	
B. A. C. 8274	7	2.52	16.5	6 59.8	19 4 25.0	-7 20.9	+0.6767	0.5308	0.1985	+82 -1	
14 Ceti	6	+2.50	+16.0	-1 7.0	20 4 28.9	-8 0.1	-0.8116	0.5236	+0.2049	-8 -90	
15 Ceti	6½	2.49	15.9	-1 7.0	5 48.4	-6 42.9	-0.5399	0.5232	0.2051	+9 -72	
26 Ceti	6	2.48	15.2	+0 46.3	19 13.7	+6 18.8	+0.1528	0.5201	0.2044	+46 -29	
29 Ceti	6½	2.48	15.0	1 24.8	21 24.8	+8 26.2	-0.0927	0.5196	0.2039	+32 -42	
33 Ceti	6	2.48	14.9	1 51.2	22 45.9	+9 45.0	-0.3061	0.5202	0.2041	+21 -56	
35 Ceti	6½	+2.48	+14.8	+1 53.0	23 48.1	+10 45.3	-0.1275	0.5188	+0.2037	+31 -45	
f Piscium	5	2.47	14.5	3 1.7	21 2 33.9	-10 33.7	-0.8181	0.5189	0.2030	-7 -87	
ν Piscium	4½	2.46	13.6	4 55.4	14 59.7	+1 30.6	-0.3950	0.5183	0.1990	+16 -61	
64 Ceti	5½	2.43	11.9	8 2.9	22 6 44.4	-7 11.9	-0.7579	0.5180	0.1910	-4 -77	
ξ Ceti	4½	2.42	11.8	8 19.5	7 35.8	-6 22.1	-0.8991	0.5182	0.1905	-13 -82	
ξ Ceti	4½	+2.39	+11.2	+7 57.7	15 33.8	+1 22.1	+1.0000	0.5186	+0.1854	+90 +22	
B. A. C. 830	6	2.38	10.2	10 16.0	23 2.3	+8 37.5	-0.1805	0.5196	0.1798	+27 -44	
μ Ceti	4½	2.36	10.2	9 38.6	23 0 18.5	+9 51.5	+0.7348	0.5195	0.1786	+90 +6	
Lalande 5725	6	2.34	8.6	12 45.6	11 26.3	-3 20.2	-0.7767	0.5216	0.1688	-6 -77	
B. A. C. 1272	6	2.17	4.1	17 2.5	24 18 47.3	+3 4.6	-0.7506	0.5295	0.1339	-5 -73	
δ Tauri	4	+2.11	+3.2	+17 16.9	25 2 14.7	+10 18.3	-0.0573	0.5317	+0.1239	+34 -31	
63 Tauri	6	+2.10	+3.4	+16 30.9	2 30.0	+10 33.2	+0.8226	0.5319	+0.1233	+90 +18	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
$\delta$ Tauri	5 $\frac{1}{2}$	+2.11	+3.2	+17° 11.1	25 2 49.3	+10 51.7	+0.1201	0.5317	+0.1229	+44	-21
$\delta$ Tauri	5	2.10	3.0	17 40.3	3 30.2	+11 31.5	-0.3364	0.5319	0.1220	+19	-46
B. A. C. 1468	6 $\frac{1}{2}$	2.02	1.7	18 31.8	13 44.6	-2 33.1	-0.1126	0.5351	0.1072	+31	-32
$\epsilon$ Tauri	5 $\frac{1}{2}$	2.00	1.4	18 38.9	16 13.9	-0 8.5	+0.0185	0.5358	0.1035	+39	-24
$m$ Tauri	5 $\frac{1}{2}$	1.93	0.7	18 29.6	26 0 1.2	+7 24.1	+0.9466	0.5387	0.0910	+90	+30
$l$ Tauri	5 $\frac{1}{2}$	+1.95	+0.2	+20 16.2	0 11.3	+7 33.8	-1.0020	0.5387	+0.0910	-23	-70
$\zeta$ Tauri	3 $\frac{1}{2}$	1.81	-1.6	21 4.4	14 28.0	-2 36.9	-0.7556	0.5437	0.0670	-6	-69
$\chi$ Orionis	4 $\frac{1}{2}$	1.72	2.0	20 15.2	22 24.6	+5 4.8	+0.6282	0.5455	0.0530	+85	+14
$\gamma$ Orionis	6	1.71	1.8	19 43.5	22 40.4	+5 19.5	+1.2220	0.5455	0.0528	+90	+59
$\chi$ Orionis	5	1.66	2.3	20 8.4	27 2 52.7	+9 23.5	+0.9707	0.5478	0.0453	+90	+36
15 Geminorum	6 $\frac{1}{2}$	+1.54	-3.6	+20 51.4	13 57.8	-3 53.4	+0.5702	0.5503	+0.0248	+78	+14
16 Geminorum	6 $\frac{1}{2}$	1.53	3.5	20 33.7	14 3.0	-3 48.3	+0.8962	0.5503	0.0246	+90	+33
$\nu$ Geminorum	4 $\frac{1}{2}$	1.53	3.4	20 16.8	14 31.5	-3 20.7	+1.2150	0.5505	0.0237	+90	+60
$d$ Geminorum	6	1.41	4.7	21 53.5	28 0 52.7	+6 39.6	-0.4011	0.5537	+0.0038	+14	-30
$\zeta$ Geminor. mult.	4	1.34	4.7	20 43.0	6 38.4	-11 46.4	+0.8496	0.5554	-0.0072	+90	+32
$\delta$ Geminorum	3 $\frac{1}{2}$	+1.25	-5.5	+22 11.2	13 53.1	-4 46.4	-0.8339	0.5571	-0.0216	-12	-68
56 Geminorum	5 $\frac{1}{2}$	1.24	5.0	20 39.2	14 44.8	-3 56.5	+0.8068	0.5573	0.0233	+90	+28
61 Geminorum	6	1.20	5.1	20 28.7	17 0.3	-1 45.6	+0.9369	0.5573	0.0278	+90	+36
63 Geminorum	5 $\frac{1}{2}$	1.20	5.5	21 40.2	17 20.7	-1 25.9	-0.3620	0.5573	0.0283	+17	-39
79 Geminorum	6 $\frac{1}{2}$	1.10	5.5	20 35.0	29 1 13.6	+6 10.7	+0.5259	0.5591	0.0437	+74	+10
85 Geminorum	6	+1.03	-5.5	+20 10.6	5 57.2	+10 44.6	+0.7298	0.5595	-0.0533	+90	+20
B. A. C. 2788	6	0.89	6.3	21 5.9	16 59.2	-2 36.2	-0.9645	0.5613	0.0750	-21	-69
$\eta$ Cancri	5 $\frac{1}{2}$	0.82	6.3	20 49.1	22 31.1	+2 44.1	-1.1070	0.5620	0.0859	-33	-69
35 Cancri	6 $\frac{1}{2}$	0.80	6.1	19 58.4	23 41.9	+3 52.4	-0.3116	0.5613	0.0879	+20	-41
39 Cancri	6 $\frac{1}{2}$	0.77	6.2	20 24.1	30 1 49.6	+5 55.7	-0.9574	0.5622	0.0920	-20	-70
40 Cancri	6 $\frac{1}{2}$	+0.77	-6.2	+20 21.9	1 51.8	+5 57.8	-0.9222	0.5622	-0.0922	-17	-70
$\epsilon$ Cancri	6 $\frac{1}{2}$	0.77	6.0	19 56.5	15.92	+6 5.0	-0.4850	0.5624	0.0924	+10	-54
$\delta$ Cancri	4	0.75	5.7	18 33.8	3 53.8	+7 55.6	+0.7986	0.5624	0.0961	+90	+20
80 Cancri	6 $\frac{1}{2}$	0.61	5.8	18 30.1	16 2.6	-4 21.0	-0.4422	0.5632	0.1186	+13	-54
83 Cancri	5 $\frac{1}{2}$	+0.58	-5.6	18 10.7	19 11.0	-1 19.1	-0.4816	0.5636	0.1242	+10	-56
SATURN				+16 25.7	22 17.1	+1 40.5	+0.9679	0.5527	-0.0386	+90	+27

OCTOBER.

8 Leonis	5 $\frac{1}{2}$	+0.49	-5.4	+16 56.2	1 3 13.9	+6 26.9	-0.2349	0.5590	-0.1372	+24	-41
34 Leonis	6 $\frac{1}{2}$	+0.35	-4.5	+13 54.4	18 39.3	-2 39.8	+0.5845	0.5639	-0.1633	+78	+1
37 Leonis	5 $\frac{1}{2}$	0.33	4.4	14 17.1	20 54.1	-0 29.7	-0.1773	0.5636	0.1663	+27	-41
$l$ Leonis	5 $\frac{1}{2}$	0.22	3.3	11 8.2	2 11 25.9	-10 28.2	+0.4931	0.5640	0.1865	+69	-7
B. A. C. 3837	6 $\frac{1}{2}$	0.16	2.5	8 40.4	22 28.2	+0 11.1	+0.8712	0.5644	0.1992	+90	+23
$\nu$ Virginis	4	0.12	-1.8	+7 9.4	3 12 37.6	-10 9.1	-0.5058	0.5649	0.2118	+10	-68
NEW MOON.											
$\xi$ Libræ	6	+0.30	+2.1	-11 26.5	6 22 1.8	-3 39.8	+0.2768	0.5824	-0.1963	+50	-22
$\zeta$ Libræ	5 $\frac{1}{2}$	0.31	2.2	10 37.5	23 1.5	-2 42.3	-0.3954	0.5826	0.1952	+12	-62
17 Libræ	7	0.31	2.2	10 42.2	23 38.9	-2 6.3	-0.7676	0.5828	0.1944	-9	-90
18 Libræ	6 $\frac{1}{2}$	+0.31	+2.3	-10 41.7	23 54.9	-1 50.8	-0.8285	0.5829	-0.1939	-12	-90
$\gamma$ Libræ	4 $\frac{1}{2}$	0.45	2.4	14 24.9	7 14 54.7	-11 25.1	+0.0940	0.5876	0.1726	+36	-32
$\eta$ Libræ	6	0.48	2.4	15 18.9	18 22.7	-8 5.1	+0.3968	0.5893	0.1671	+53	-16
$\theta$ Libræ	4 $\frac{1}{2}$	0.52	2.3	16 24.0	22 18.2	-4 18.4	+0.8299	0.5902	0.1605	+74	+10
49 Libræ	6	0.55	2.5	16 12.2	8 0 58.3	-1 44.5	+0.2133	0.5906	0.1554	+41	-26
$\gamma$ Ophiuchi	4 $\frac{1}{2}$	+0.67	+2.6	-18 12.1	11 37.0	+8 29.5	+0.6510	0.5940	-0.1355	+68	-1
24 Scorpii	5 $\frac{1}{2}$	0.73	3.3	17 31.4	17 25.6	-9 55.6	-0.7771	0.5952	0.1235	-17	-90
29 Ophiuchi	4 $\frac{1}{2}$	0.83	3.4	18 43.1	9 1 27.2	-2 12.9	-0.5084	0.5956	0.1062	-4	-72
$\xi$ Ophiuchi	6	0.94	3.3	20 59.4	8 58.3	+5 0.4	+1.0320	0.5962	0.0891	+69	+26
58 Ophiuchi	5 $\frac{1}{2}$	1.05	3.7	21 37.6	17 49.8	-10 29.0	+0.9763	0.5958	0.0689	+68	+22
B. A. C. 6098	6	+1.14	+4.5	-20 44.0	10 1 25.3	-3 11.5	-0.3770	0.5958	-0.0505	-2	-63
$\mu$ Sagittarii	4	+1.19	+4.7	-21 5.2	5 49.4	+1 2.2	-0.2225	0.5952	-0.0401	+7	-51

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
14 Sagittarii	6	+1.20	+ 4.5	-21 44.4	10 6 0.5	+ 1 12.9	+0.4324	0.5960	-0.0398	+44	-13
15 Sagittarii	5½	1.19	4.9	20 45.5	6 24.4	+ 1 35.9	-0.5777	0.5957	0.0387	-13	-79
16 Sagittarii	6½	1.19	5.0	20 25.1	6 24.8	+ 1 36.2	-0.9239	0.5957	0.0387	-34	-90
21 Sagittarii	5	1.24	5.3	20 35.9	10 25.7	+ 5 27.6	-0.8782	0.5952	0.0290	-32	-90
B. A. C. 6336	6	1.32	5.3	21 29.3	15 23.9	+10 14.1	-0.0898	0.5936	0.0169	+11	-43
B. A. C. 6347	6	+1.32	+ 5.5	-21 8.4	15 48.5	+10 37.8	-0.4508	0.5936	-0.0161	- 9	-68
28 Sagittarii	5½	1.37	5.3	22 30.4	18 45.1	-10 32.5	+0.9032	0.5930	0.0092	+67	+17
30 Sagittarii	6½	1.39	5.5	22 17.3	20 33.5	- 8 48.3	+0.6688	0.5919	0.0048	+61	+ 1
31 Sagittarii	6½	1.39	5.6	22 3.0	21 4.7	- 8 18.3	+0.4244	0.5916	0.0034	+40	-13
33 Sagittarii	6	1.40	5.8	21 29.7	21 50.2	- 7 34.6	-0.1443	0.5912	0.0017	+ 7	-46
ν <sup>1</sup> Sagittarii	5	+1.41	+ 5.4	-22 52.8	21 52.6	- 7 32.3	+1.2690	0.5921	-0.0017	+67	+62
ν <sup>2</sup> Sagittarii	5	1.41	5.4	22 48.5	22 15.2	- 7 10.5	+1.1960	0.5919	-0.0007	+67	+45
ξ <sup>1</sup> Sagittarii	5½	1.40	6.2	20 48.0	23 11.4	- 6 16.6	-0.8537	0.5915	+0.0017	-35	-90
ξ <sup>2</sup> Sagittarii	3½	1.41	6.1	21 15.0	23 20.2	- 6 8.1	-0.3945	0.5928	0.0017	- 7	-63
η Sagittarii	3½	1.45	6.1	21 54.2	11 2 7.1	- 3 27.7	+0.2857	0.5895	0.0085	+32	-21
π Sagittarii	3	+1.47	+ 6.5	-21 11.9	4 11.1	- 1 28.5	-0.4129	0.5902	+0.0133	- 7	-65
50 Sagittarii	6	1.56	6.8	21 59.7	10 52.7	+ 4 57.7	+0.5462	0.5875	0.0288	+52	- 6
f Sagittarii	5	1.65	8.1	20 1.7	19 8.5	-11 5.3	-1.1630	0.5835	0.0475	-53	-90
σ Capricorni	5½	1.81	9.2	19 27.8	12 8 55.8	+ 2 11.2	-0.8978	0.5768	0.0767	-28	-90
ο Capricorni	6	1.85	9.7	18 56.9	13 23.8	+ 6 29.3	-1.0720	0.5740	0.0857	-40	-90
ν Capricorni	5½	+1.89	+10.1	-18 31.8	17 45.4	+10 41.4	-1.1180	0.5725	+0.0939	-44	-90
19 Capricorni	6	1.95	10.6	18 20.6	13 0 9.0	- 7 8.7	-0.6759	0.5679	0.1059	-12	-90
20 Capricorni	6½	1.97	10.3	19 27.9	2 13.8	- 5 8.3	+0.7242	0.5670	0.1098	+70	+ 4
21 Capricorni	6½	1.98	10.8	17 57.7	2 48.4	- 4 35.0	-0.7870	0.5667	0.1108	-18	-90
θ Capricorni	4	2.00	11.0	17 40.4	5 2.2	- 2 25.9	-0.8373	0.5656	0.1147	-21	-90
30 Capricorni	5½	+2.05	+11.1	-18 27.0	10 21.5	+ 2 42.2	+0.6113	0.5622	+0.1237	+65	- 3
31 Capricorni	6½	2.05	11.3	17 55.7	10 30.1	+ 2 50.6	+0.0806	0.5619	0.1241	+31	-33
ι Capricorni	4½	2.06	11.5	17 18.5	12 17.5	+ 4 34.3	-0.3473	0.5614	0.1271	+ 9	-59
γ Capricorni	3½	2.13	12.0	17 9.8	20 20.8	-11 39.0	+0.5748	0.5558	0.1390	+64	- 5
45 Capricorni	6½	2.13	12.6	15 15.5	22 10.4	- 9 53.1	-1.1810	0.5547	0.1419	-44	-90
δ Capricorni	2½	+2.16	+12.3	-16 37.9	23 31.8	- 8 34.5	+0.4630	0.5540	+0.1439	+57	-12
ι Aquarii	4½	2.22	13.3	14 24.6	14 8 33.5	+ 0 9.2	-0.5346	0.5492	0.1561	+ 2	-73
39 Aquarii	6½	2.24	13.4	14 44.5	11 22.1	+ 2 52.3	+0.2619	0.5473	0.1595	+45	-23
42 Aquarii	5½	2.26	13.8	13 23.1	13 26.9	+ 4 53.0	-0.8494	0.5463	0.1621	-16	-90
45 Aquarii	6½	2.27	13.7	13 51.7	14 29.1	+ 5 53.2	-0.1720	0.5458	0.1633	+22	-48
50 Aquarii	6	+2.29	+13.7	-14 5.7	17 4.3	+ 8 23.3	+0.5045	0.5444	+0.1664	+63	-10
B. A. C. 7836	6½	2.30	13.9	13 29.2	19 44.0	+10 57.9	+0.3037	0.5424	0.1690	+50	-21
70 Aquarii	6	2.36	14.7	11 8.6	15 4 41.6	- 4 21.6	-0.6448	0.5389	0.1784	- 2	-84
Lalande 44734	6½	2.37	14.9	10 39.1	6 45.2	- 2 21.9	-0.8019	0.5375	0.1802	-11	-90
74 Aquarii	6	2.38	14.5	12 12.6	7 7.2	- 2 0.6	+0.9342	0.5369	0.1805	+78	+16
ψ <sup>1</sup> Aquarii	4	+2.44	+15.2	- 9 41.5	18 12.0	+ 8 43.6	+0.2831	0.5315	+0.1892	+52	-22
χ Aquarii	5½	2.43	15.5	8 19.9	18 42.4	+ 9 13.1	-1.0820	0.5316	0.1894	-28	-90
ψ <sup>2</sup> Aquarii	4	2.44	15.2	9 47.4	19 13.7	+ 9 43.4	+0.5860	0.5313	0.1900	+72	- 6
ψ <sup>3</sup> Aquarii	4½	2.44	15.2	10 13.1	19 45.2	+10 14.0	+1.1460	0.5309	0.1901	+80	+31
B. A. C. 8274	7	2.52	15.8	6 59.8	16 10 44.8	+ 0 46.4	+0.5993	0.5264	0.1993	+76	- 5
14 Ceti	6	+2.61	+16.1	- 1 7.0	17 11 7.2	+ 0 25.8	-0.8383	0.5198	+0.2059	- 9	-90
15 Ceti	6½	2.62	16.0	- 1 7.0	12 27.4	+ 1 43.6	-0.5636	0.5195	0.2061	+ 8	-75
26 Ceti	6	2.67	15.5	+ 0 46.3	18 2 0.2	- 9 7.1	+0.1643	0.5175	0.2057	+47	-29
29 Ceti	6½	2.67	15.5	1 24.8	4 12.9	- 6 58.2	-0.0840	0.5171	0.2053	+34	-43
33 Ceti	6	2.68	15.4	1 51.3	5 34.7	- 5 38.7	-0.2889	0.5177	0.2056	+23	-55
35 Ceti	6½	+2.68	+15.4	+ 1 53.1	6 37.4	- 4 37.9	-0.1079	0.5174	+0.2054	+32	-44
f Piscium	5	2.70	15.3	3 1.8	9 24.3	- 1 55.7	-0.7934	0.5169	0.2046	- 5	-87
ν Piscium	4½	2.74	14.5	4 55.4	21 55.2	+10 13.6	-0.3358	0.5172	0.2009	+20	-57
64 Ceti	5½	2.79	13.1	8 2.9	19 13 43.9	+ 1 35.2	-0.6631	0.5182	0.1936	+ 2	-80
ξ <sup>1</sup> Ceti	4½	2.79	13.1	8 19.5	14 35.4	+ 2 25.1	-0.8011	0.5184	0.1931	- 7	-82
ξ <sup>2</sup> Ceti	4½	+2.79	+12.4	+ 7 57.7	22 34.6	+ 0 10.5	+1.1200	0.5184	+0.1875	+90	+30
B. A. C. 830	6	+2.82	+11.5	+10 16.0	20 6 3.7	- 4 33.5	-0.0443	0.5200	+0.1820	+35	-37

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
$\mu$ Ceti	4 $\frac{1}{2}$	+2.81	+11.4	+ 9 38.6	20 7 20.1	- 5 19.3	+0.8746	0.5199	+0.1810	+90	+14
Lalande 5725	6	2.84	10.0	12 45.7	18 28.1	+ 5 29.3	-0.6193	0.5226	0.1712	+ 4	-72
B. A. C. 1272	6	2.82	5.5	17 2.5	22 1 47.6	+11 52.5	-0.5342	0.5293	0.1353	+ 8	-62
$\delta^1$ Tauri	4	2.80	4.5	17 16.9	9 14.7	- 4 54.1	+0.1704	0.5320	0.1256	+48	-12
63 Tauri	6	2.79	4.6	16 30.9	9 30.0	- 4 39.2	+1.0540	0.5321	0.1250	+90	+34
$\delta^2$ Tauri	5 $\frac{1}{2}$	+2.79	+ 4.5	+17 11.1	9 49.3	- 4 20.5	+0.3500	0.5323	+0.1247	+59	- 9
$\delta^3$ Tauri	5	2.79	4.3	17 40.3	10 30.3	- 3 40.8	-0.1092	0.5328	0.1238	+31	-34
B. A. C. 1468	6 $\frac{1}{2}$	2.75	2.7	18 31.8	20 44.8	+ 6 14.7	+0.1296	0.5365	0.1087	+44	-20
$\epsilon$ Tauri	5 $\frac{1}{2}$	2.74	2.4	18 38.9	23 14.3	+ 8 39.5	+0.2629	0.5365	0.1052	+54	-11
$\eta$ Tauri	5 $\frac{1}{2}$	2.69	1.4	18 29.6	23 7 2.5	- 7 47.0	+1.2050	0.5386	0.0924	+90	+53
$\zeta$ Tauri	5 $\frac{1}{2}$	+2.71	+ 0.9	+20 16.2	7 12.7	- 7 37.2	-0.7487	0.5383	+0.0924	- 5	-70
$\chi$ Tauri	3 $\frac{1}{2}$	2.61	- 1.2	21 4.4	21 32.3	+ 6 15.0	-0.4890	0.5424	0.0681	+10	-51
$\chi^1$ Orionis	4 $\frac{1}{2}$	2.53	1.9	20 15.2	24 5 31.6	-10 1.2	+0.9059	0.5451	0.0542	+90	+31
$\chi^2$ Orionis	5	2.49	2.4	20 8.4	10 1.5	- 5 40.1	+1.2580	0.5458	0.0460	+90	+65
$\eta$ Geminorum	3 $\frac{1}{2}$	2.47	3.7	22 32.3	15 8.0	- 0 43.5	-1.1800	0.5465	0.0366	-42	-67
$\mu$ Geminorum	3	+2.43	- 4.3	+22 34.1	18 54.8	+ 2 55.8	-1.0890	0.5479	+0.0296	-32	-67
15 Geminorum	6 $\frac{1}{2}$	2.39	4.0	20 51.4	21 12.6	+ 5 9.1	+0.8622	0.5489	0.0255	+90	+31
16 Geminorum	6 $\frac{1}{2}$	2.38	4.0	20 33.7	21 17.8	+ 5 14.2	+1.1900	0.5489	0.0254	+90	+57
$\delta$ Geminorum	6	2.28	5.7	21 53.5	25 8 15.2	- 8 10.2	-0.1154	0.5507	+0.0042	+31	-21
$\zeta$ Geminor. mult.	4	2.19	6.0	20 43.9	14 5.7	- 2 31.4	+1.1500	0.5517	-0.0069	+90	+54
44 Geminorum	6	+2.21	- 6.6	+22 48.1	14 36.1	- 2 2.0	-1.1250	0.5517	-0.0081	-36	-67
$\delta$ Geminorum	3 $\frac{1}{2}$	2.11	7.2	22 11.2	21 26.7	+ 4 34.9	-0.5483	0.5501	0.0213	+ 6	-52
56 Geminorum	5 $\frac{1}{2}$	2.09	6.7	20 39.2	22 19.6	+ 5 25.9	+1.1080	0.5524	0.0228	+90	+50
61 Geminorum	6	2.06	6.9	20 28.7	26 0 37.4	+ 7 39.2	+1.2430	0.5531	0.0273	+90	+63
63 Geminorum	5 $\frac{1}{2}$	2.06	7.3	21 40.2	0 58.3	+ 7 59.4	-0.0710	0.5531	0.0281	+33	-22
79 Geminorum	6 $\frac{1}{2}$	+1.96	- 7.6	+20 35.0	8 59.4	- 8 15.7	+0.8243	0.5529	-0.0439	+90	+27
85 Geminorum	6	1.89	7.9	20 10.6	13 49.0	- 3 35.8	+1.0330	0.5531	0.0528	+90	+40
$\mu^2$ Cancri	5 $\frac{1}{2}$	1.82	8.9	21 54.3	19 19.2	+ 1 43.2	-1.1620	0.5538	0.0631	-39	-68
B. A. C. 2788	6	1.74	9.0	21 5.8	27 1 5.4	+ 7 17.7	-0.6833	0.5537	0.0743	- 1	-67
$\eta$ Cancri	5 $\frac{1}{2}$	1.65	9.2	20 49.0	6 45.1	-11 14.1	-0.8316	0.5537	0.0850	-11	-69
35 Cancri	6 $\frac{1}{2}$	+1.63	- 9.0	+19 58.3	7 57.6	-10 4.1	-0.0269	0.5539	-0.0873	+36	-25
39 Cancri	6 $\frac{1}{2}$	1.61	9.2	20 24.0	10 8.4	- 7 57.7	-0.6797	0.5541	0.0911	- 1	-68
40 Cancri	6 $\frac{1}{2}$	1.61	9.2	20 21.8	10 10.7	- 7 55.5	-0.6441	0.5541	0.0912	+ 1	-65
$\epsilon$ Cancri	6 $\frac{1}{2}$	1.60	9.1	19 56.4	10 18.2	- 7 48.1	-0.2021	0.5541	0.0914	+26	-35
$\delta$ Cancri	4	1.57	8.7	18 33.8	12 15.8	- 5 54.5	+1.0930	0.5543	0.0948	+90	+41
80 Cancri	6 $\frac{1}{2}$	+1.39	- 9.3	+18 30.0	28 0 43.4	+ 6 7.7	-0.1720	0.5538	-0.1174	+28	-36
83 Cancri	5 $\frac{1}{2}$	1.35	9.3	18 10.6	3 56.7	+ 9 14.5	-0.2160	0.5539	0.1230	+25	-39
8 Leonis	5 $\frac{1}{2}$	1.23	9.1	16 56.1	12 12.7	- 6 46.3	+0.0264	0.5546	0.1370	+39	-27
34 Leonis	6 $\frac{1}{2}$	1.03	8.4	13 54.4	29 4 3.8	+ 8 32.7	+0.8310	0.5539	0.1617	+90	+15
37 Leonis	5 $\frac{1}{2}$	1.00	8.4	14 17.1	6 22.1	+10 46.2	+0.0591	0.5537	0.1648	+91	-24
$\iota$ Leonis	5 $\frac{1}{2}$	+0.84	- 7.3	+11 8.2	21 17.0	+ 1 10.9	+0.7120	0.5551	-0.1852	+90	+ 6
B. A. C. 3837	6 $\frac{1}{2}$	0.72	6.5	8 40.3	30 8 35.3	-11 53.7	+1.0740	0.5560	0.1980	+90	+25
$\nu$ Virginis	4	0.58	5.6	7 9.3	23 2.6	+ 2 4.1	-0.3485	0.5582	0.2115	+19	-57
$\beta$ Virginis	5 $\frac{1}{2}$	0.55	4.6	4 16.6	31 5 24.3	+ 8 12.7	+1.2060	0.5599	0.2166	+90	+37
$\epsilon$ Virginis	5 $\frac{1}{2}$	0.47	4.1	3 56.1	14 34.8	- 6 55.8	-0.4624	0.5611	0.2216	+13	-67
B. A. C. 4254	6	+0.42	- 3.4	+ 2 28.2	22 35.8	+ 0 48.5	-0.7816	0.5631	-0.2249	- 5	-72

NOVEMBER.

				NEW	MOON.						
$\theta$ Libræ	4 $\frac{1}{2}$	+0.39	+ 2.4	-16 24.0	4 8 14.3	+ 7 25.7	+0.6900	0.5984	-0.1653	+73	+ 1
$\chi$ Ophiuchi	4 $\frac{1}{2}$	0.47	3.0	18 12.0	21 8.9	- 4 10.6	+0.4804	0.6029	0.1402	+57	-11
24 Scorpii	5 $\frac{1}{2}$	0.50	3.3	17 31.4	5 2 46.1	+ 1 12.9	-0.9361	0.6047	0.1278	-27	-90
29 Ophiuchi	6 $\frac{1}{2}$	0.56	3.6	18 43.1	10 31.2	+ 8 39.1	-0.6852	0.6064	0.1100	-13	-90
$\xi$ Ophiuchi	5	+0.63	+ 3.7	-20 59.4	17 46.1	- 8 23.9	+0.8156	0.6074	-0.0929	+69	+10
58 Ophiuchi	5 $\frac{1}{2}$	+0.70	+ 4.1	-21 37.6	6 2 18.5	- 0 12.5	+0.7457	0.6078	-0.0723	+68	+ 5

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

## NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	$\Upsilon$	$z'$	$y'$	N.	S.	
		$\Delta\alpha$	$\Delta\delta$		d h m	h m						
B. A. C. 6098	6	+0.77	+ 4.5	-20° 44.0	6 9 37.1	+ 6 48.2	-0.5977	0.6075	-0.0531	-13	-82	
$\mu$ Sagittarii	4	0.82	4.7	21 5.2	13 51.5	+10 52.0	-0.4494	0.6067	0.0423	- 6	-68	
14 Sagittarii	6	0.82	4.6	21 44.4	14 2.2	+11 2.4	+0.1940	0.6066	0.0419	+29	-27	
15 Sagittarii	5½	0.82	4.8	20 45.5	14 25.1	+11 24.4	-0.7992	0.6066	0.0406	-26	-90	
16 Sagittarii	6½	0.82	4.9	20 25.1	14 25.7	+11 24.8	-1.1380	0.6066	0.0406	-50	-90	
21 Sagittarii	5	+0.86	+ 5.2	-20 35.9	18 17.8	- 8 52.5	-1.1020	0.6064	-0.0310	-49	-90	
B. A. C. 6336	6	0.91	5.2	21 29.3	23 5.5	- 4 16.5	-0.3300	0.6047	0.0185	- 2	-59	
B. A. C. 6347	6	0.92	5.3	21 8.4	23 28.7	- 3 54.2	-0.6866	0.6046	0.0175	-22	-90	
28 Sagittarii	5½	0.95	5.1	22 30.4	7 2 19.0	- 1 10.9	+0.6411	0.6036	0.0105	+58	- 1	
30 Sagittarii	6½	0.97	5.3	22 17.3	4 3.6	+ 0 29.5	+0.4079	0.6032	0.0057	+39	-14	
31 Sagittarii	6½	+0.97	+ 5.5	-22 3.0	4 33.8	+ 0 58.5	+0.1672	0.6029	-0.0043	+25	-28	
33 Sagittarii	6	0.98	5.5	21 29.7	5 17.8	+ 1 40.7	-0.3929	0.6025	0.0030	- 7	-63	
$\nu^1$ Sagittarii	5	0.98	5.2	22 52.8	5 20.1	+ 1 43.0	+0.9965	0.6025	0.0028	+67	+24	
$\nu^2$ Sagittarii	5	0.99	5.3	22 48.5	5 41.8	+ 2 3.8	+0.9247	0.6022	-0.0017	+67	+18	
$\xi^1$ Sagittarii	5½	0.99	5.8	20 48.0	6 36.1	+ 2 55.8	-1.0910	0.6025	+0.0003	-50	-90	
$\xi^2$ Sagittarii	3½	+0.99	+ 5.7	-21 15.0	6 44.6	+ 3 3.9	-0.6397	0.6025	+0.0007	-20	-87	
$\sigma$ Sagittarii	3½	1.02	5.7	21 54.2	9 25.6	+ 5 38.5	+0.0285	0.6012	0.0077	+17	-36	
$\pi$ Sagittarii	3	1.04	5.9	21 11.9	11 25.3	+ 7 33.4	-0.6610	0.5995	0.0127	-20	-90	
50 Sagittarii	6	1.12	6.1	21 59.7	17 53.7	-10 13.7	+0.2766	0.5973	0.0285	+33	-22	
$\sigma$ Capricorni	5½	1.35	8.0	19 27.9	8 15 17.5	+10 20.4	-1.1620	0.5843	0.0774	-50	-90	
19 Capricorni	6	+1.52	+ 9.0	-18 20.7	9 6 9.1	+ 0 38.8	-0.9464	0.5735	+0.1069	-29	-90	
20 Capricorni	6½	1.54	8.8	19 28.0	8 11.3	+ 2 36.6	+0.4369	0.5719	0.1108	+52	-13	
21 Capricorni	6½	1.54	9.3	17 57.7	8 45.2	+ 3 9.2	-1.0580	0.5715	0.1119	-37	-90	
$\theta$ Capricorni	4	1.56	9.5	17 40.4	10 56.6	+ 5 15.9	-1.1110	0.5698	0.1159	-40	-90	
30 Capricorni	5½	1.62	9.5	18 27.0	16 9.7	+10 17.7	+0.3246	0.5659	0.1250	+45	-20	
31 Capricorni	6½	+1.62	+ 9.7	-17 55.7	16 18.2	+10 26.0	-0.2014	0.5659	+0.1252	+16	-50	
$\kappa$ Capricorni	4½	1.64	9.9	17 18.5	18 3.8	-11 52.0	-0.6231	0.5639	0.1281	- 7	-83	
$\gamma$ Capricorni	3½	1.72	10.2	17 9.8	10 1 59.9	- 4 12.5	+0.2897	0.5582	0.1407	+45	-22	
$\delta$ Capricorni	2½	1.75	10.4	16 37.9	5 8.4	- 1 10.5	+0.1818	0.5559	0.1451	+39	-27	
$\alpha$ Aquarii	4½	1.84	11.3	14 24.6	14 4.4	+ 7 27.4	-0.8031	0.5499	0.1573	-14	-90	
39 Aquarii	6½	+1.87	+11.3	-14 44.5	16 51.7	+10 9.2	-0.0106	0.5482	+0.1607	+30	-38	
42 Aquarii	5½	1.89	11.8	13 23.1	18 55.5	-11 51.1	-1.1130	0.5471	0.1633	-34	-90	
45 Aquarii	6½	1.90	11.7	13 51.7	19 57.3	-10 51.3	-0.4410	0.5459	0.1644	+ 8	-66	
50 Aquarii	6	1.92	11.7	14 5.7	22 31.3	- 8 22.4	+0.2350	0.5440	0.1675	+45	-25	
B. A. C. 7835	6½	1.95	11.9	13 29.2	11 1 10.4	- 5 48.3	+0.0372	0.5428	0.1703	+34	-36	
70 Aquarii	6	+2.03	+12.7	-11 8.6	10 6.1	+ 2 50.2	-0.8984	0.5375	+0.1794	-17	-90	
Lalande 44734	6½	2.05	12.9	10 39.1	12 9.6	+ 4 49.9	-1.0530	0.5359	0.1809	-27	-90	
74 Aquarii	6	2.06	12.4	12 12.6	12 31.3	+ 5 10.9	+0.6761	0.5357	0.1814	+77	- 1	
$\psi^1$ Aquarii	4	2.16	13.1	9 41.6	23 36.4	- 8 4.6	+0.0429	0.5293	0.1900	+37	-35	
$\psi^2$ Aquarii	4	2.17	13.0	9 47.5	12 0 38.3	- 7 4.7	+0.3458	0.5295	0.1911	+55	-19	
$\chi^2$ Aquarii	4½	+2.17	+12.9	-10 13.2	1 9.8	- 6 34.1	+0.9067	0.5292	+0.1912	+80	+14	
B. A. C. 8274	7	2.31	13.5	6 59.9	16 13.3	+ 8 2.2	+0.3837	0.5222	0.1994	+60	-17	
14 Ceti	6	2.51	14.7	1 7.1	13 16 46.6	+ 7 52.5	-1.0000	0.5115	0.2046	-18	-90	
15 Ceti	6½	2.53	14.6	- 1 7.1	18 7.8	+ 9 11.4	-0.7231	0.5158	0.2065	- 2	-90	
26 Ceti	6	2.64	14.4	+ 0 46.2	14 7 48.5	- 1 31.4	+0.0292	0.5136	0.2064	+40	-36	
29 Ceti	6½	+2.66	+14.4	+ 1 24.7	10 2.0	+ 0 38.4	-0.2162	0.5139	+0.2064	+27	-51	
33 Ceti	6	2.67	14.4	1 51.2	11 24.8	+ 1 58.8	-0.4176	0.5136	0.2063	+16	-64	
35 Ceti	6½	2.68	14.4	1 53.0	12 27.9	+ 3 0.0	-0.2326	0.5135	0.2061	+26	-52	
$f$ Piscium	5	2.71	14.3	3 1.7	15 16.6	+ 5 44.0	-0.9122	0.5131	0.2054	-12	-87	
$\nu$ Piscium	4½	2.80	13.8	4 55.4	15 3 54.2	- 5 59.9	-0.4265	0.5138	0.2020	+15	-64	
64 Ceti	5½	+2.93	+13.0	+ 8 2.9	19 50.7	+ 9 29.4	-0.7159	0.5156	+0.1949	- 1	-83	
$\epsilon^1$ Ceti	4½	2.94	13.0	8 19.5	20 42.6	+10 19.8	-0.8525	0.5157	0.1943	-10	-82	
$\epsilon^2$ Ceti	4½	2.98	12.1	7 57.7	16 4 45.0	- 5 51.6	+1.0920	0.5172	0.1895	+90	+28	
B. A. C. 830	6	3.04	11.5	10 16.0	12 16.6	+ 1 26.9	-0.0573	0.5183	0.1840	+35	-33	
$\mu$ Ceti	4½	3.04	11.3	9 38.6	13 33.4	+ 2 41.5	+0.8670	0.5184	0.1828	+90	+13	
Lalande 5725	6	+3.13	+10.2	+12 45.7	17 0 44.2	-10 27.1	-0.6019	0.5216	+0.1734	+ 5	-71	
B. A. C. 1272	6	+3.28	+ 6.0	+17 2.5	18 8 6.2	- 4 1.4	-0.4472	0.5313	+0.1380	+13	-56	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

## NOVEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels	
Name.	Mag.	Red'ns from 1888.0.		Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
$\beta$ Tauri	4	+3.28	+ 4.8	+17 16.9	18 15 32.9	+ 3 11.6	+0.2746	0.5335	+0.1280	+54	-13
63 Tauri	6	3.27	4.8	16 30.9	15 48.2	+ 3 26.5	+1.1610	0.5337	0.1276	+90	+43
$\delta$ Tauri	5 $\frac{1}{2}$	3.28	4.7	17 11.1	16 7.5	+ 3 45.2	+0.4564	0.5338	0.1272	+68	- 3
$\theta$ Tauri	5	3.29	4.6	17 40.3	16 48.3	+ 4 24.8	+0.0019	0.5338	0.1264	+38	-27
$\epsilon$ Tauri	3 $\frac{1}{2}$	3.31	4.2	18 56.0	18 19.5	+ 5 53.1	-1.2130	0.5348	0.1244	-43	-71
B. A. C. 1468	6 $\frac{1}{2}$	+3.30	+ 2.9	+18 31.8	19 3 1.8	- 9 40.8	+0.2593	0.5367	+0.1109	+53	-12
$\iota$ Tauri	5 $\frac{1}{2}$	2.29	2.5	18 38.9	5 30.9	- 7 16.4	+0.3982	0.5378	0.1070	+63	- 5
$\lambda$ Tauri	5 $\frac{1}{2}$	3.32	+ 1.2	20 16.2	13 28.0	+ 0 25.6	-0.6019	0.5405	0.0942	+ 4	-62
$\zeta$ Tauri	3 $\frac{1}{2}$	3.29	- 1.2	21 4.4	20 3 45.7	- 9 44.1	-0.3161	0.5438	0.0703	+20	-40
$\chi$ Orionis	4 $\frac{1}{2}$	3.25	2.6	20 15.2	11 44.0	- 2 1.3	+1.0960	0.5465	0.0560	+90	+45
141 Tauri	6 $\frac{1}{2}$	+3.27	- 3.3	+22 23.7	15 7.4	+ 1 15.5	-1.0980	0.5465	+0.0499	-32	-68
$\eta$ Geminorum	3 $\frac{1}{2}$	3.24	4.4	22 32.2	21 19.5	+ 7 15.5	-0.9835	0.5483	0.0384	-22	-67
$\mu$ Geminorum	3	3.20	4.9	22 34.1	21 1 6.2	+10 54.7	-0.8876	0.5496	0.0312	-15	-67
15 Geminorum	6 $\frac{1}{2}$	3.16	5.0	20 51.4	3 24.1	-10 51.9	+1.0720	0.5492	0.0265	+90	+45
$\delta$ Geminorum	6	3.09	7.0	21 53.5	14 27.2	- 0 10.7	+0.1085	0.5508	+0.0055	+44	-10
44 Geminorum	6	+3.05	- 8.0	+22 48.1	20 49.0	+ 5 58.3	-0.8991	0.5512	-0.0068	-16	-67
$\delta$ Geminorum	3 $\frac{1}{2}$	2.97	9.0	22 11.1	22 3 41.8	-11 22.5	-0.3114	0.5516	0.0202	+20	-34
63 Geminorum	5 $\frac{1}{2}$	2.92	9.4	21 40.1	7 14.1	- 6 57.4	+0.1740	0.5525	0.0269	+48	- 8
79 Geminorum	6 $\frac{1}{2}$	2.82	10.1	20 34.9	15 18.4	- 0 9.2	+1.0820	0.5516	0.0424	+90	+45
$\mu^2$ Cancri	5 $\frac{1}{2}$	2.71	11.5	21 54.2	23 1 44.2	+ 9 55.7	-0.9109	0.5512	0.0626	-17	-68
B. A. C. 2788	6	+2.63	-12.0	+21 5.8	7 34.5	- 8 25.7	-0.4301	0.5511	-0.0737	+13	-47
$\eta$ Cancri	5 $\frac{1}{2}$	2.56	12.5	20 49.0	13 19.0	- 2 52.6	-0.5778	0.5507	0.0819	+ 5	-59
35 Cancri	6 $\frac{1}{2}$	2.53	12.4	19 58.3	14 32.6	- 1 41.5	+0.2387	0.5496	0.0861	+52	-10
39 Cancri	6 $\frac{1}{2}$	2.51	12.7	20 24.0	16 45.4	+ 0 26.8	-0.4232	0.5501	0.0902	+14	-48
40 Cancri	6 $\frac{1}{2}$	2.51	12.7	20 21.8	16 47.8	+ 0 29.1	-0.3870	0.5501	0.0904	+16	-46
$\epsilon$ Cancri	6 $\frac{1}{2}$	+2.51	-12.6	+19 56.4	16 55.3	+ 0 36.4	+0.0615	0.5501	-0.0906	+42	-20
80 Cancri	6 $\frac{1}{2}$	2.30	13.4	18 30.0	24 7 36.1	- 9 12.0	+0.0969	0.5483	0.1163	+43	-21
83 Cancri	5 $\frac{1}{2}$	2.25	13.5	18 10.6	10 53.8	- 6 0.9	+0.0555	0.5480	0.1217	+41	-24
8 Leonis	5 $\frac{1}{2}$	2.13	13.6	16 56.1	19 21.3	+ 2 9.9	+0.2965	0.5474	0.1354	+56	-12
34 Leonis	6 $\frac{1}{2}$	1.90	13.0	13 54.3	25 11 38.0	- 6 5.4	+1.1200	0.5473	0.1600	+90	+36
37 Leonis	5 $\frac{1}{2}$	+1.86	-13.2	+14 17.0	14 0.4	- 3 47.7	+0.3321	0.5457	-0.1631	+58	-14
$\lambda$ Leonis	5 $\frac{1}{2}$	1.65	12.5	11 8.1	26 5 23.5	+11 5.2	+0.9824	0.5445	0.1825	+90	+22
B. A. C. 3837	6 $\frac{1}{2}$	1.50	11.6	8 40.2	17 5.2	- 1 36.0	+1.3420	0.5450	0.1953	+90	+62
$\omega$ Virginis	6	1.38	10.8	8 45.1	27 4 35.0	+ 9 31.2	-1.0500	0.5466	0.2061	-23	-81
$\nu$ Virginis	4	1.34	10.8	7 9.2	8 3.5	-11 7.2	-0.1202	0.5490	0.2085	+31	-43
$\epsilon$ Virginis	5 $\frac{1}{2}$	+1.17	- 9.2	+ 3 56.0	28 0 9.1	+ 4 26.5	-0.2601	0.5501	-0.2189	+24	-53
B. A. C. 4254	6	1.10	8.3	+ 2 28.2	8 27.0	-11 32.2	-0.6008	0.5529	0.2223	+ 6	-78
80 Virginis	6	0.90	5.0	- 4 49.6	29 10 10.8	-10 41.2	+0.9734	0.5643	0.2242	+85	+16
88 Virginis	6 $\frac{1}{2}$	+0.86	- 4.2	- 6 16.8	15 47.4	- 5 16.5	+1.1660	0.5669	-0.2226	+84	+31

## DECEMBER.

				NEW MOON.							
$\mu$ Sagittarii	4	+0.74	+ 4.6	-21 5.2	4 0 25.8	- 0 45.5	-0.5639	0.6163	-0.0448	-12	-78
15 Sagittarii	5 $\frac{1}{2}$	+0.74	+ 4.6	-20 45.5	0 58.4	- 0 14.2	-0.9114	0.6163	-0.0434	-33	-90
B. A. C. 6336	6	0.79	5.1	21 29.3	9 23.5	+ 7 49.6	-0.4637	0.6151	0.0204	- 9	-69
B. A. C. 6347	6	0.80	5.1	21 8.4	9 46.0	+ 8 11.2	-0.8156	0.6152	0.0197	+10	-45
28 Sagittarii	5 $\frac{1}{2}$	0.81	5.1	22 30.4	12 30.8	+10 49.0	+0.4925	0.6145	0.0120	+46	-10
30 Sagittarii	6 $\frac{1}{2}$	0.82	5.3	22 17.3	14 12.0	-11 34.0	+0.2586	0.6138	0.0076	+30	-23
31 Sagittarii	6 $\frac{1}{2}$	+0.82	+ 5.3	-22 3.0	14 41.1	-11 6.1	+0.0198	0.6137	-0.0064	+26	-37
33 Sagittarii	6	0.82	5.4	21 29.7	15 23.7	-10 25.3	-0.5346	0.6141	0.0043	-14	-75
$\nu^1$ Sagittarii	5	0.83	5.2	22 52.8	15 25.9	-10 23.2	+0.8366	0.6141	0.0043	+67	+12
$\nu^2$ Sagittarii	5	0.83	5.3	22 48.5	15 47.0	-10 2.9	+0.7638	0.6138	0.0035	+67	+ 7
$\xi^2$ Sagittarii	3 $\frac{1}{2}$	0.84	5.4	21 15.0	16 47.7	- 9 4.9	-0.7803	0.6131	-0.0008	-28	-90
$\sigma$ Sagittarii	3 $\frac{1}{2}$	+0.86	+ 5.5	-21 54.2	19 23.3	- 6 35.8	-0.1256	0.6124	+0.0063	+ 9	-45
$\pi$ Sagittarii	3	+0.86	+ 5.7	-21 11.9	21 19.0	- 4 44.8	-0.8084	0.6113	+0.0113	-20	-90

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Magn.	Red'ns from 1888.0.	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$							
50 Sagittarii	6	+0.91	+5.9	-21° 59.7	5 3 33.7	+1 14.4	+0.1046	0.6092	+0.0276	+23° -32°
Mars				20 37.2	5 5 14.8	+1 53.6	+0.2517	0.5135	-0.0693	+36 -23
19 Capricorni	6	0.98	6.7	18 20.7	14 29.4	+10 46.9	-1.1440	0.5847	+0.1088	-45 -90
20 Capricorni	6½	1.00	6.5	19 28.0	16 27.2	-11 19.6	+0.2157	0.5824	0.1124	+37 -26
30 Capricorni	5½	1.29	8.2	18 27.1	7 0 9.2	-3 54.9	+0.1023	0.5755	0.1266	+32 -32
31 Capricorni	6½	+1.29	+8.3	-17 55.8	0 16.9	-3 47.5	-0.4163	0.5755	+0.1268	+4 -64
Capricorni	4½	1.30	8.5	17 18.6	1 58.9	-2 9.2	-0.8375	0.5744	0.1301	-20 -90
Capricorni	3½	1.38	8.7	17 9.9	9 38.9	+5 14.2	+0.0584	0.5678	0.1427	+32 -35
Capricorni	2½	1.40	8.9	16 38.0	12 41.2	+8 10.0	-0.0482	0.5650	0.1472	+27 -41
Aquarii	4½	1.49	9.7	14 24.6	21 20.5	-7 28.8	-1.0280	0.5586	0.1595	-28 -90
39 Aquarii	6½	+1.52	+9.7	-14 44.5	8 0 2.9	-4 52.0	-0.2482	0.5560	+0.1632	+18 -52
45 Aquarii	6½	1.56	10.0	13 51.7	3 3.2	-1 57.8	-0.6712	0.5534	0.1668	-5 -88
50 Aquarii	6	1.58	10.0	14 5.7	5 33.0	+0 27.0	-0.0087	0.5512	0.1695	+32 -38
B. A. C. 7835	6½	1.61	10.2	13 29.2	8 7.6	+2 56.4	-0.2024	0.5494	0.1726	+22 -50
70 Aquarii	6	1.69	11.0	11 8.6	16 49.8	+11 21.5	-1.1260	0.5434	0.1816	-33 -90
74 Aquarii	6	+1.72	+10.7	-12 12.6	19 11.6	-10 21.3	+0.4287	0.5411	+0.1835	+59 -15
Aquarii	4	1.83	11.4	9 41.6	9 6 2.8	+0 9.3	-0.1946	0.5337	0.1921	+24 -49
Aquarii	4	1.85	11.3	9 47.5	7 3.3	+1 7.8	+0.1045	0.5328	0.1926	+40 -32
Aquarii	4½	1.85	11.2	10 13.2	7 34.4	+1 38.0	+0.6602	0.5323	0.1930	+78 -2
B. A. C. 8274	7	2.01	11.9	6 59.9	22 23.5	-8 0.2	+0.1503	0.5255	0.2014	+45 -29
30 Piscium	4½	+2.08	+11.8	-6 38.0	10 5 14.8	-1 21.1	+1.1470	0.5224	+0.2040	+83 +30
33 Piscium	4½	2.10	11.8	6 19.8	6 59.4	+0 20.4	+1.1780	0.5211	0.2043	+84 +33
B. A. C. 17	6	2.13	11.9	5 52.0	9 33.5	+2 49.9	+1.2050	0.5202	0.2052	+84 +36
14 Ceti	6	2.28	13.0	1 7.1	22 43.2	-8 23.4	-1.2190	0.5159	0.2077	-37 -90
15 Ceti	6½	2.30	12.8	-1 7.1	11 0 3.8	-7 5.1	-0.9385	0.5152	0.2077	-15 -90
26 Ceti	6	+2.45	+12.7	+0 46.2	13 41.8	+6 9.3	-0.1694	0.5123	+0.2073	+28 -48
29 Ceti	6½	2.47	12.8	1 24.7	15 55.2	+8 19.0	-0.4106	0.5128	0.2072	+16 -63
33 Ceti	6	2.49	12.9	1 51.2	17 17.9	+9 39.3	-0.6095	0.5124	0.2072	+5 -79
35 Ceti	6½	2.50	12.8	1 53.0	18 21.1	+10 40.7	-0.4252	0.5121	0.2068	+15 -64
Piscium	5	2.54	13.0	3 1.7	21 9.7	-10 35.5	-1.0960	0.5110	0.2059	-26 -87
Piscium	4½	+2.68	+12.6	+4 55.4	12 9 48.4	+1 41.7	-0.5983	0.5119	+0.2026	+6 -77
64 Ceti	5½	2.86	12.0	8 2.9	13 1 48.1	-6 45.8	-0.8620	0.5125	0.1954	-10 -82
Ceti	4½	2.87	11.9	8 19.5	2 40.2	-5 55.2	-0.9984	0.5127	0.1949	-19 -82
Ceti	4½	2.94	11.0	7 57.7	10 44.8	+1 55.6	+0.9576	0.5139	0.1899	+90 +18
B. A. C. 830	6	3.04	10.7	10 16.0	18 18.6	+9 16.4	-0.1774	0.5157	0.1846	+28 -45
Ceti	4½	+3.04	+10.5	+9 38.6	19 35.8	+10 31.4	+0.7487	0.5164	+0.1836	+90 +6
Lalande 5725	6	3.18	9.8	12 45.7	14 6 49.9	-2 34.0	-0.7000	0.5192	0.1743	-1 -73
B. A. C. 1272	6	3.50	5.8	17 2.5	15 14 18.2	+3 58.1	-0.4908	0.5296	0.1396	+11 -59
Tauri	4	3.54	4.7	17 16.9	21 45.3	+11 11.5	+0.2444	0.5323	0.1292	+53 -15
63 Tauri	6	3.53	4.6	16 30.9	22 0.8	+11 26.5	+1.1300	0.5326	0.1289	+90 +40
Tauri	5½	+3.54	+4.6	+17 11.1	22 20.0	+11 45.2	+0.4260	0.5323	+0.1287	+65 -6
Tauri	5	3.56	4.5	17 40.3	23 0.9	-11 35.2	-0.0259	0.5331	0.1276	+36 -29
B. A. C. 1468	6½	3.63	2.8	18 31.8	16 9 14.0	-1 41.1	+0.2463	0.5373	0.1128	+53 -13
Tauri	5½	3.64	2.3	18 38.9	11 43.1	+0 43.3	+0.3907	0.5386	0.1089	+63 -5
Tauri	5½	3.70	+1.0	20 16.2	19 39.4	+8 24.5	-0.5971	0.5405	0.0961	+4 -62
Tauri	3½	+3.74	-1.5	+21 4.4	17 9 54.2	-1 48.2	-0.2884	0.5464	+0.0719	+22 -38
Orionis	4½	3.74	3.0	20 15.1	17 50.0	+5 52.8	+1.1350	0.5483	0.0577	+90 +48
141 Tauri	6½	3.78	3.6	22 23.7	21 12.5	+2 47.5	-1.0530	0.5492	0.0516	-28 -68
Geminorum	3½	3.77	4.7	22 32.2	18 3 22.4	-3 22.4	-0.9286	0.5504	0.0398	-16 -67
Geminorum	3	3.77	5.5	22 34.1	7 7.7	-7 7.7	-0.8252	0.5520	0.0326	-11 -67
15 Geminorum	6½	+3.74	-5.8	+20 51.4	9 24.6	-9 24.6	+1.1350	0.5526	+0.0282	+90 +52
Geminorum	6	3.73	7.9	21 53.5	20 23.4	+3 36.6	+0.1836	0.5535	+0.0070	+49 -6
Geminorum	6	3.72	9.1	22 48.0	19 2 42.5	-10 20.7	-0.8112	0.5547	-0.0055	-10 -67
Geminorum	3½	3.67	10.2	22 11.1	9 32.4	-3 44.5	-0.2198	0.5550	0.0189	+25 -28
63 Geminorum	5½	3.64	10.9	21 40.1	13 3.3	-0 20.8	+0.2687	0.5546	0.0259	+55 -3
79 Geminorum	6½	+3.57	-12.1	+20 34.9	21 4.6	+7 24.4	+1.1870	0.5546	-0.0418	+90 +55
84 Geminorum	6½	+3.57	-12.9	+22 37.0	20 0 39.0	+10 51.5	-1.2020	0.5550	-0.0488	-44 -67



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Magn.	Red'ns from 1888.0.		Apparent Declination	Washington Mean Time.	Hour Angle H	Y	'z'	y'	N. S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m				
$\mu^3$ Cancri	5 $\frac{1}{2}$	+3.51	-13.9	+21 54.2	20 7 26.9	- 6 34.2	-0.7978	0.5543	-0.0620	- 9 -68
B. A. C. 2788	6	3.44	14.6	21 5.7	13 15.8	- 0 57.0	-0.3055	0.5538	0.0728	+20 -39
$\eta$ Cancri	5 $\frac{1}{2}$	3.39	15.3	20 48.9	18 59.1	+ 4 34.8	-0.4482	0.5529	0.0835	+12 -50
35 Cancri	6 $\frac{1}{2}$	3.36	15.4	19 58.2	20 12.5	+ 5 45.7	+0.3684	0.5530	0.0858	+61 -4
39 Cancri	6 $\frac{1}{2}$	3.34	15.7	20 23.9	22 24.9	+ 7 53.7	-0.2880	0.5520	0.0895	+22 -40
40 Cancri	6 $\frac{1}{2}$	+3.34	-15.7	+20 21.7	22 27.3	+ 7 56.0	-0.2536	0.5520	-0.0895	+24 -37
$\epsilon$ Cancri	6 $\frac{1}{2}$	3.34	15.7	19 56.3	22 34.9	+ 8 3.5	+0.1958	0.5520	0.0899	+50 -13
80 Cancri	6 $\frac{1}{2}$	3.16	17.0	18 29.9	21 13 15.5	- 1 45.2	+0.2432	0.5491	0.1157	+53 -13
83 Cancri	5 $\frac{1}{2}$	3.12	17.1	18 10.5	16 33.5	+ 1 26.3	+0.2014	0.5480	0.1211	+50 -16
8 Leonis	5 $\frac{1}{2}$	3.01	17.6	16 56.0	22 1 3.0	+ 9 39.0	+0.4524	0.5470	0.1348	+67 -5
34 Leonis	6 $\frac{1}{2}$	+2.80	-18.0	+13 54.2	17 27.3	+ 1 31.3	+1.2870	0.5439	-0.1587	+90 +56
37 Leonis	5 $\frac{1}{2}$	2.75	18.1	14 16.9	19 51.3	+ 3 50.6	+0.4974	0.5438	0.1620	+71 -5
42 Leonis	6	2.75	18.5	15 32.1	22 18.5	+ 6 13.1	-1.2440	0.5429	0.1652	-44 -74
$\iota$ Leonis	5 $\frac{1}{2}$	2.69	18.5	14 42.4	23 3 15.8	+11 0.8	-1.1890	0.5414	0.1713	-37 -75
$l$ Leonis	5 $\frac{1}{2}$	2.58	17.7	11 8.0	11 28.2	- 5 2.6	+1.1610	0.5415	0.1811	+90 +37
$\omega$ Virginis	6	+2.28	-17.2	+ 8 45.0	24 11 10.7	- 6 5.6	-0.9003	0.5395	-0.2035	-12 -81
$\nu$ Virginis	4	2.24	16.6	7 9.1	14 44.9	- 2 38.2	+0.0454	0.5399	0.2062	+40 -34
$\epsilon$ Virginis	5 $\frac{1}{2}$	2.06	14.9	3 56.0	25 7 20.3	-10 34.6	-0.1055	0.5416	0.2158	+32 -43
B. A. C. 4254	6	1.97	14.2	+ 2 28.1	15 55.4	- 2 16.1	-0.4561	0.5429	0.2190	+13 -66
80 Virginis	6	1.71	10.2	- 4 49.7	26 18 38.1	- 0 26.0	+1.1200	0.5520	0.2202	+85 +28
88 Virginis	6 $\frac{1}{2}$	+1.67	- 9.3	- 6 16.9	27 0 28.1	+ 5 12.2	+1.3140	0.5546	-0.2186	+84 +49
$\xi^1$ Libræ	6	1.44	5.2	11 26.6	28 5 35.9	+ 9 18.9	+0.3651	0.5724	0.1992	+56 -19
$\xi^2$ Libræ	5 $\frac{1}{2}$	1.43	5.0	10 57.6	6 37.4	+10 18.2	-0.3212	0.5724	0.1981	+17 -57
17 Libræ	7	1.41	5.0	10 42.3	7 15.8	+10 55.2	-0.7039	0.5729	0.1975	- 5 -90
18 Libræ	6 $\frac{1}{2}$	1.41	5.1	10 41.9	7 32.3	+11 11.2	-0.7638	0.5733	0.1970	- 8 -90
$\gamma$ Libræ	4 $\frac{1}{2}$	+1.33	- 2.8	-14 24.9	22 48.0	+ 1 52.8	+0.0678	0.5837	-0.1778	+35 -34
$\eta$ Libræ	6	1.31	2.2	15 18.9	29 2 17.3	+ 5 14.2	+0.3505	0.5871	0.1729	+52 -19
$\theta$ Libræ	4 $\frac{1}{2}$	1.29	1.6	16 24.0	6 13.1	+ 9 1.0	+0.7556	0.5893	0.1665	+74 +4
49 Libræ	6	1.26	- 1.4	16 12.2	8 52.6	+11 34.4	+0.1238	0.5917	0.1620	+36 -31
$\chi$ Ophiuchi	4 $\frac{1}{2}$	1.21	0.0	18 12.1	19 23.8	- 2 19.2	+0.4967	0.5963	0.1424	+58 -10
24 Scorpii	5 $\frac{1}{2}$	+1.18	+ 0.4	-17 31.5	30 1 4.8	+ 3 8.1	-0.9491	0.6017	-0.1307	-27 -90
$\xi$ Ophiuchi	5	+1.11	+ 2.2	-20 59.5	16 5.2	- 6 28.2	+0.7506	0.6098	-0.0967	+69 +5
				NEW	MOON.					

## OCCULTATIONS VISIBLE AT WASHINGTON DURING THE YEAR 1888.

Date.	THE STAR'S		IMMERISION.				EMERISION.				Duration of Occul- tation.
			Washington.		Angle from		Washington.		Angle from		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
			h m	h m	°	°	h m	h m			h m
Jan. 1	7 Leonis	6½	13 45	18 59	161	107	14 24	19 38	340	286	0 39
3	B. A. C. 3837	6½	6 41	11 47	66	117	7 30	12 36	333	22	0 49
7	ξ¹ Libræ	6	10 16	15 16	177	222	10 44	15 45	231	275	0 28
	NEW MOON.										
15	ι Aquarii *	4½	3 16	7 36	137	85	4 7	8 27	264	212	0 51
21	μ Ceti	4½	3 28	7 25	53	34	4 55	8 51	257	216	1 26
22	f Tauri	4	2 37	6 30	155	174	Star 5'·8	south of	♂'s	limb.	
23	75 Tauri	6½	8 49	12 37	172	118	Star 4'·0	south of	♂'s	limb.	
25	χ³ Orionis	6	1 43	5 24	46	102	2 43	6 24	289	343	0 59
25	68 Orionis	6	6 55	10 35	97	70	8 19	12 0	261	210	1 25
31	b Virginis	5½	13 6	16 22	93	70	14 13	17 29	324	286	1 7
Feb. 2	88 Virginis	6½	14 11	17 19	209	201	Star 7'·8	south of	♂'s	limb.	
4	γ Libræ	4½	11 28	14 28	171	224	12 3	15 3	236	287	0 35
	NEW MOON.										
17	ξ² Ceti	4½	5 33	7 44	159	113	Star 4'·8	south of	♂'s	limb.	
21	127 Tauri	6½	4 40	6 35	169	197	Star 6'·0	south of	♂'s	limb.	
21	χ³ Orionis	6	12 0	13 53	2	310	Star 4'·7	north of	♂'s	limb.	
24	θ Cancri	5½	5 11	6 54	89	142	6 29	8 11	283	327	1 18
25	ψ Leonis	6	14 3	15 40	127	73	14 58	16 36	273	220	0 56
Mar. 5	μ Sagittarii †	4	12 53	13 55	159	207	13 26	14 28	224	271	0 33
5	15 Sagittarii	5½	13 16	14 18	63	111	14 8	15 10	319	3	0 51
	NEW MOON.										
26	b Virginis	5½	11 12	10 52	109	122	12 28	12 7	310	299	1 15
29	ξ¹ Libræ	6	12 2	11 30	95	130	13 8	12 36	319	342	1 6
30	49 Libræ	6	15 52	15 16	77	77	17 0	16 23	322	307	1 7
Apr. 1	B. A. C. 6098	6	17 24	16 40	8	15	Star 8'·2	north of	♂'s	limb.	
2	33 Sagittarii *	6	13 3	12 15	126	175	13 56	13 7	249	296	0 52
2	ξ² Sagittarii	3½	14 53	14 4	37	81	15 29	14 40	336	14	0 36
	NEW MOON.										
12	μ Ceti	4½	8 25	6 59	165	112	Star 2'·5	south of	♂'s	limb.	
14	63 Tauri †	6	10 21	8 46	81	29	11 18	9 43	267	218	0 57
15	m Tauri	5½	7 3	5 25	87	42	8 26	6 48	261	207	1 23
16	χ³ Orionis	5	10 23	8 41	73	17	11 24	9 41	293	238	1 1
19	θ Cancri	4	10 44	8 50	18	332	Star 5'·7	north of	♂'s	limb.	
24	80 Virginis	6	18 17	16 2	48	359	18 43	16 28	353	302	0 26
27	χ Ophiuchi	4½	14 3	11 36	201	231	Star 3'·6	south of	♂'s	limb.	
29	B. A. C. 6336	6	17 19	14 44	5	21	Star 2'·6	north of	♂'s	limb.	
May 3	45 Aquarii	6½	17 12	14 21	348	37	Star 6'·2	north of	♂'s	limb.	
	NEW MOON.										
16	θ Cancri	5½	14 2	10 22	195	141	Star 1'·4	south of	♂'s	limb.	
19	B. A. C. 3837	6½	15 7	11 14	61	11	15 45	11 52	349	298	0 37
23	ξ¹ Libræ	6	13 45	9 37	47	62	14 11	10 2	8	18	0 25
24	θ Libræ	4½	13 54	9 41	204	229	Star 7'·1	south of	♂'s	limb.	

NOTE. The angles of position are counted from the north point and vertex of the moon's limb, toward the east.

\* Whole occultation below the horizon of Washington.

† Immersion below the horizon of Washington.

‡ Emerison below the horizon of Washington.

## OCCULTATIONS VISIBLE AT WASHINGTON DURING THE YEAR 1888.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occul- tation.
			Washington.		Angle from		Washington.		Angle from		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
May 24	49 Libræ	6	<sup>h</sup> 17 <sup>m</sup> 3	<sup>h</sup> 12 <sup>m</sup> 50	18°	2°	<sup>h</sup> Star 5 <sup>m</sup> 7.7	<sup>h</sup> north of	<sup>h</sup> D's	<sup>h</sup> limb.	<sup>h</sup> m
27	o Sagittarii	3½	14 7	9 42	104	151	15 11	10 46	272	314	1 4
	NEW MOON.										
June 18	80 Virginis	6	15 39	9 48	136	104	16 47	10 56	278	237	1 7
21	χ Ophiuchi	4½	14 34	8 31	182	205	14 59	8 56	221	239	0 25
26	γ Capricorni	3½	18 28	12 5	63	100	19 46	13 23	268	291	1 18
26	δ Capricorni	2½	23 3	16 40	71	53	0 20	17 56	241	208	1 17
27	B. A. C. 7835	6½	17 39	11 12	346	33	Star 6 <sup>m</sup> 5	north of	D's	limb.	
July 2	ξ Ceti	4½	20 43	13 56	42	94	21 42	14 54	270	321	0 59
	NEW MOON.										
20	14 Sagittarii	6	19 36	11 38	88	68	20 52	12 54	272	239	1 16
21	o Sagittarii †	3½	13 33	5 32	99	149	14 33	6 33	275	320	1 1
23	30 Capricorni	5½	21 14	13 5	85	84	22 33	14 24	235	217	1 19
24	39 Aquarii	6½	22 6	13 53	337	337	Star 4 <sup>m</sup> 5	north of	D's	limb.	
26	B. A. C. 8274	7	18 58	10 37	340	29	Star 2 <sup>m</sup> 8	north of	D's	limb.	
	NEW MOON.										
Aug. 13	ξ Libræ	6	18 23	8 52	19	33	Star 1 <sup>m</sup> 8	north of	D's	limb.	
17	30 Sagittarii	6½	18 45	8 58	131	131	19 48	10 0	228	215	1 2
17	31 Sagittarii	6½	19 24	9 36	76	67	20 44	10 56	277	251	1 20
20	γ Capricorni †	3½	16 1	6 2	77	127	17 4	7 5	265	311	1 4
20	δ Capricorni	2½	20 7	10 8	37	58	21 18	11 18	285	291	1 11
26	μ Ceti	4½	2 11	15 47	76	87	3 39	17 15	225	203	1 28
29	m Tauri	5½	0 56	14 20	107	162	1 57	15 21	216	269	1 1
30	χ Orionis	4½	23 38	12 58	347	49	Star 0 <sup>m</sup> 4	north of	D's	limb.	
30	χ Orionis	6	23 40	13 0	167	220	Star 2 <sup>m</sup> 0	south of	D's	limb.	
Sept. 1	79 Geminorum †	6½	1 25	14 37	39	346	2 5	15 17	315	10	0 40
	NEW MOON.										
17	50 Aquarii	6	23 1	11 11	56	46	0 21	12 31	250	223	1 20
17	B. A. C. 7835	6½	2 37	14 46	70	25	3 38	15 48	243	193	1 1
18	ψ Aquarii	4	0 23	12 29	9	351	1 14	13 19	291	262	0 51
18	ψ Aquarii	4	1 17	13 22	93	64	2 20	14 25	208	169	1 3
27	15 Geminorum	6½	0 32	12 2	80	134	1 36	13 6	259	316	1 4
27	16 Geminorum	6½	1 2	12 32	169	225	Star 3 <sup>m</sup> 0	south of	D's	limb.	
28	56 Geminorum	5½	1 53	13 19	165	220	Star 1 <sup>m</sup> 8	south of	D's	limb.	
	NEW MOON.										
Oct. 10	14 Sagittarii	6	19 56	6 36	1	337	Star 8 <sup>m</sup> 4	north of	D's	limb.	
13	30 Capricorni	5½	0 30	10 57	75	37	1 36	12 3	242	197	1 6
14	39 Aquarii	6½	2 6	12 29	14	330	2 46	13 9	297	250	0 40
15	74 Aquarii	6	19 5	5 25	72	114	20 23	6 43	244	275	1 18
16	B. A. C. 8274	7	0 17	10 33	55	46	1 40	11 56	241	212	1 23
20	μ Ceti †	4½	19 25	5 26	63	111	20 20	6 21	255	306	0 55
	NEW MOON.										

NOTE.—The angles of position are counted from the north point and vertex of the moon's limb, toward the east.

\* Whole occultation below the horizon of Washington.

† Immersion below the horizon of Washington.

‡ Emersion below the horizon of Washington.

## OCCULTATIONS VISIBLE AT WASHINGTON DURING THE YEAR 1888.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from		Washington.		Angle from		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
			<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup>		<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup>		<sup>h</sup> <sup>m</sup>
Nov. 7	$\nu^1$ Sagittarii	5	20 47	5 37	124	99	21 43	6 33	224	189	0 56
7	$\nu^2$ Sagittarii	5	21 13	6 3	113	82	22 15	7 5	234	195	1 2
9	20 Capricorni	6 $\frac{1}{2}$	0 18	9 0	33	354	1 11	9 53	286	241	0 53
18	$\delta^2$ Tauri	5 $\frac{1}{2}$	8 56	17 0	101	46	10 0	18 5	243	190	1 5
23	35 Cancri	6 $\frac{1}{2}$	5 12	12 57	82	137	6 35	14 20	290	337	1 22
23	$\epsilon$ Cancri	6 $\frac{1}{2}$	9 17	17 2	17	353	Star 0 $\frac{1}{2}$ .9	north of	D's	limb.	
25	37 Leonis	5 $\frac{1}{2}$	4 27	12 5	102	154	5 32	13 9	283	337	1 4
NEW MOON.											
Dec. 9	$\psi^2$ Aquarii	4	1 36	8 20	329	296	Star 9 $\frac{1}{2}$ .0	north of	D's	limb.	
9	$\psi^2$ Aquarii	4 $\frac{1}{2}$	1 2	7 45	81	55	2 13	8 56	219	181	1 11
10	30 Piscium	4 $\frac{1}{2}$	21 11	3 50	130	167	21 41	4 21	173	205	0 31
13	$\xi^2$ Ceti	4 $\frac{1}{2}$	4 24	10 51	154	116	Star 6 $\frac{1}{2}$ .1	south of	D's	limb.	
16	$\delta$ Tauri	5 $\frac{1}{2}$	6 11	12 26	345	307	Star 5 $\frac{1}{2}$ .7	north of	D's	limb.	
24	$\nu$ Virginis	4	7 16	12 59	46	356	7 43	13 26	1	49	0 27



NOTE.—The angles of position are counted from the north point and vertex of the moon's limb, toward the east.

\* Whole occultation below the horizon of Washington.

† Immersion below the horizon of Washington.

‡ Emersion below the horizon of Washington.

DOWNES'S TABLE GIVING VALUES OF  $\tau$ .  
FOR COMPUTING THE TIME AND HOUR-ANGLE OF APPARENT CONJUNCTION.

A	Lat. 72°			Lat. 66°			Lat. 60°			Lat. 54°			Lat. 48°			Lat. 42°			Lat. 36°		
	$\tau'$			$\tau'$			$\tau'$			$\tau'$			$\tau'$			$\tau'$			$\tau'$		
	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50
h m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
0 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	2	2	2	2	2	2	3	3	3	3	4	4	4	5	5	5	6	6	6	7
20	3	3	4	4	5	5	5	6	7	6	7	9	8	9	11	9	10	12	11	12	14
30	5	5	6	6	7	8	8	9	11	10	11	13	12	13	16	14	16	18	16	18	22
40	6	7	8	8	9	11	11	12	14	13	15	17	16	18	21	18	21	24	21	24	29
50	7	8	10	10	11	13	13	15	17	16	19	21	19	22	26	22	26	30	26	30	36
1 0	9	10	11	12	14	16	16	18	21	19	22	26	23	26	31	26	31	36	30	35	42
10	10	12	13	14	16	18	18	21	24	22	26	30	26	30	36	31	35	42	35	40	48
20	12	13	15	16	18	21	21	23	27	25	29	34	30	34	40	35	40	47	39	45	54
30	13	15	17	18	20	23	23	26	30	28	32	37	33	38	45	39	44	52	43	50	59
40	14	16	18	20	22	25	25	29	33	31	35	41	36	42	49	42	48	57	47	54	64
50	16	18	20	21	24	28	27	31	36	34	38	44	39	45	53	45	52	61	51	58	68
2 0	17	19	22	23	26	30	29	33	39	36	41	47	42	48	56	48	55	65	54	62	72
10	18	20	23	25	28	32	31	36	41	38	43	50	45	51	59	51	59	68	57	66	76
20	19	22	24	26	30	34	33	38	43	40	46	53	47	54	62	54	62	71	60	69	80
30	20	23	26	28	31	36	35	40	45	42	48	55	50	56	65	57	64	74	63	72	83
40	21	24	27	29	33	37	37	42	47	44	50	58	52	59	68	59	67	77	65	74	86
50	22	25	28	30	34	39	38	43	49	46	52	60	54	61	70	61	69	79	68	76	88
3 0	23	26	30	31	35	40	40	45	51	48	54	62	56	63	72	63	71	81	70	79	90
10	24	27	31	33	36	42	41	46	53	49	56	63	57	65	74	65	73	83	72	81	92
20	25	28	32	34	38	43	42	47	54	51	57	65	59	66	75	66	74	85	73	82	93
30	26	29	33	35	39	44	43	49	55	52	58	66	60	67	77	68	76	86	74	83	95
40	26	29	33	36	40	45	44	50	56	53	59	67	61	69	78	69	77	87	75	84	96
50	27	30	34	36	41	46	45	51	57	54	60	68	62	70	79	70	78	88	76	85	96
4 0	28	31	35	37	41	47	46	52	58	55	61	69	63	70	79	71	79	89	77	86	97
10	28	31	35	38	42	47	47	52	59	56	62	70	64	71	80	71	79	89	78	86	97
20	29	32	36	38	42	48	47	53	59	56	62	70	64	71	80	72	80	89	78	87	97
30	29	32	36	39	43	48	48	53	60	57	63	71	65	72	81	72	80	90	79	87	97
40	29	33	37	39	43	49	48	53	60	57	63	71	65	72	81	72	80	89	79	87	97
50	30	33	37	39	44	49	48	54	60	57	63	71	65	72	81	72	80	89	79	87	96
5 0	30	33	37	39	44	49	49	54	60	57	63	71	65	72	80	72	80	89	78	86	96
10	30	33	37	40	44	49	49	54	60	57	63	71	65	72	80	72	79	88	78	86	96
20	30	33	37	40	44	49	49	54	60	57	63	71	65	71	79	72	79	88	78	85	94
30	30	33	37	40	44	49	49	54	60	57	63	70	64	71	79	71	78	87	77	85	93
40	30	33	37	39	44	49	48	53	59	56	62	70	64	70	78	70	77	86	76	84	91
50	30	33	37	39	43	48	48	53	59	56	61	69	63	70	77	70	77	85	75	83	90
6 0	30	33	37	39	43	48	48	52	58	55	61	68	63	69	76	69	76	84	74	82	89
10	30	33	37	39	43	47	47	52	58	55	60	67	62	68	75	68	75	82	73	80	87
20	29	32	36	38	42	47	47	51	57	54	60	66	61	67	74	67	73	81	72	79	85
30	29	32	36	38	42	46	46	51	56	53	59	65	60	66	73	66	72	80	71	78	84
40	29	32	36	37	41	46	45	50	55	53	58	64	59	65	71	65	71	78	70	76	82
50	28	31	35	37	40	45	45	49	54	52	57	62	58	63	70	63	69	76	68	74	80
7 0	28	31	34	36	40	44	44	48	53	51	55	61	57	62	68	62	68	75	67	73	78
10	27	30	34	35	39	43	43	47	52	50	54	60	56	61	67	61	66	73	65	71	76
20	27	30	33	35	38	42	42	46	51	48	53	58	54	59	65	59	65	71	64	69	74
30	26	29	32	34	37	41	41	45	49	47	52	57	53	58	63	58	63	69	62	67	71
40	26	28	31	33	36	40	40	44	48	46	50	55	51	56	62	56	61	67			
50	25	27	31	32	35	39	39	42	47	45	49	53	50	54	60	54	59	65			
8 0	24	27	30	31	34	38	38	41	45	43	47	52	48	52	58	53	57	63			
10	24	26	29	30	33	37	36	40	44	42	46	50	47	51	56	52	55	60			
20	23	25	28	29	32	35	35	38	42	40	44	48	45	49	54						
30	22	24	27	28	31	34	34	37	41	39	42	46	43	47	52						
40	21	23	26	27	30	33	33	35	39	37	41	44	41	45	49						
50	20	22	25	26	28	31	31	34	37	36	39	42	40	43	47						
9 0	19	21	24	25	27	30	30	32	35	34	37	40									
10	18	20	22	24	26	28	28	31	34	32	35	38									
20	18	19	21	22	24	27	27	29	32	31	33	36									
30	16	18	20	21	23	25	25	27	30	29	31	34									
40	15	17	19	20	22	24	24	26	28	27	29	32									

(Concluded at bottom of next page.)

DOWNES'S TABLE GIVING VALUES OF  $\tau$ .  
FOR COMPUTING THE TIME AND HOUR-ANGLE OF APPARENT CONJUNCTION.

h	Lat. 30°			Lat. 24°			Lat. 18°			Lat. 12°			Lat. 6°			Lat. 0°		
	$z'$			$z'$			$z'$			$z'$			$z'$			$z'$		
	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50	.62	.56	.50
0 0	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
10 0	6	7	8	7	7	9	7	8	9	7	8	10	7	8	10	8	9	11
20 0	12	14	16	13	14	18	14	16	19	14	16	20	14	17	21	15	18	21
30 0	17	20	24	19	22	27	20	24	29	21	25	30	21	25	31	22	26	32
40 0	23	27	32	25	29	36	26	32	39	28	33	40	28	34	41	29	34	42
50 0	28	33	40	31	36	44	32	39	48	35	40	50	35	42	51	35	42	52
1 0	33	39	47	36	42	52	38	46	56	40	47	59	41	49	60	41	49	61
10 1	38	45	54	41	48	59	44	52	63	46	54	67	47	56	68	47	56	69
20 1	43	50	60	46	54	65	49	58	70	52	60	74	53	62	75	53	63	76
30 1	48	55	66	51	60	71	54	64	76	57	66	79	58	68	81	59	69	82
40 1	52	60	71	56	65	77	59	69	82	62	72	84	63	73	87	64	74	88
50 1	56	64	76	60	69	82	64	74	87	66	77	89	68	78	92	68	79	93
2 0	59	68	80	64	73	86	68	78	91	70	81	95	72	83	97	72	83	98
10 2	62	72	84	67	77	90	71	81	95	74	85	99	75	87	101	76	87	102
20 2	65	76	87	70	81	94	74	85	99	77	88	103	78	90	105	79	91	106
30 2	68	78	90	73	84	97	77	88	102	80	91	106	81	93	108	82	94	109
40 2	71	81	93	76	87	100	80	91	105	83	94	109	84	96	111	85	97	112
50 2	74	83	96	78	89	102	82	93	107	85	96	111	87	98	113	87	99	114
3 0	76	85	98	80	91	104	84	95	109	87	98	113	89	100	115	89	101	116
10 3	77	87	99	82	92	106	86	97	111	89	100	114	91	102	116	91	103	117
20 3	79	89	101	84	94	107	88	99	112	91	102	115	92	104	118	93	104	118
30 3	80	90	102	85	95	108	89	100	113	92	103	116	94	105	119	94	105	119
40 3	81	91	103	86	96	109	90	101	114	93	104	117	95	106	119	95	106	120
50 3	82	92	104	87	97	110	91	101	114	94	104	118	95	106	120	96	107	120
4 0	83	92	104	88	98	110	92	102	114	94	105	118	96	107	120	97	107	120
10 4	84	93	104	88	98	110	92	102	114	95	105	118	96	107	120	97	107	120
20 4	84	93	104	89	98	110	92	102	114	95	105	117	96	107	119	97	107	120
30 4	84	93	104	89	98	110	92	102	114	95	105	117	96	107	119	97	107	119
40 4	84	93	104	89	98	109	92	102	113	95	104	116	96	106	118	97	107	119
50 4	84	93	103	88	97	108	92	101	113	94	104	115	96	106	117	96	106	118
5 0	84	92	102	88	97	108	91	101	112	94	103	114	95	105	116	96	105	117
10 5	83	92	102	88	96	107	91	100	110	93	102	113	95	104	115	95	104	116
20 5	83	91	101	87	95	106	90	99	109	92	101	112	94	103	114	94	103	114
30 5	82	90	100	86	94	104	89	98	108	92	100	111	93	102	112	93	102	113
40 5	81	89	98	85	93	103	88	97	106	91	99	109	92	100	110			
50 5	80	88	97	84	92	101	87	95	105	89	97	107						
6 0	79	87	95	83	91	100	86	94	103	88	96	105						
10 6	78	85	94	82	89	98	84	92	101									
20 6	77	84	92	80	88	96	82	91	99									
30 6	75	82	90	79	86	94												
40 6	74	81	88	77	84	92												
50 6	72	79	86															
7 0	71	77	84															

(Concluded from preceding page.)

k			Lat. 72°			Lat. 66°			Lat. 60°			k			Lat. 72°			Lat. 66°			Lat. 60°			
			z'			z'			z'						z'			z'			z'			
			.62	.56	.50	.62	.56	.50	.62	.56	.50				.62	.56	.50	.62	.56	.50	.62	.56	.50	
h	m		m	m	m	m	m	m	m	m	m	m	h	m		m	m	m	m	m	m	m	m	m
9	50		14	16	18	18	20	22	22	24	26		11	0		7	8	8	9	10	11	10	11	12
10	0		13	15	16	17	19	21	20	22	24		10			6	6	7	7	8	9	9	9	10
	10		12	14	15	16	17	19	19	21	22		20			5	5	6	6	6	7	7	8	8
	20		11	12	14	15	16	17	17	19	20		30			3	4	4	4	5	5			
	30		10	11	12	13	14	16	16	17	18		40			2	3	3	3	3	4			
	40		9	10	11	12	13	14	14	15	16		50			1	1	1	1	2	2			
	50		8	9	10	10	11	12	12	13	14		12	0		0	0	0	0	0	0			

## FOR WASHINGTON MEAN NOON.

Date.	$k$	$i$	$\theta$	$L$	Date.	$k$	$i$	$\theta$	$L$
Jan. 1	0.985	21.7	174.7	25.3	July 4	0.026	161.6	38.5	4.1
6	0.981	15.9	166.1	24.9	9	0.009	168.9	106.0	1.6
11	0.992	10.2	151.8	25.6	14	0.041	156.5	156.0	6.8
16	0.996	5.2	113.9	27.6	19	0.119	139.6	169.6	18.0
21	0.997	6.6	33.5	31.1	24	0.238	121.6	176.4	32.1
26	0.984	14.5	3.8	36.6	29	0.392	102.5	182.1	46.8
31	0.952	25.4	351.9	44.7	Aug. 3	0.571	81.9	187.9	60.3
Feb. 5	0.892	40.2	344.7	55.3	8	0.752	59.7	194.5	68.7
10	0.756	59.2	339.3	65.8	13	0.891	38.5	202.6	67.9
15	0.592	82.8	334.9	68.2	18	0.975	18.2	215.3	59.9
20	0.331	108.7	330.4	53.3	23	0.998	5.2	279.4	49.4
25	0.122	138.2	322.9	24.1	28	0.968	12.7	3.1	40.7
Mar. 1	0.018	164.5	295.2	3.8	Sept. 2	0.962	22.4	15.4	34.5
6	0.024	162.3	187.7	4.7	7	0.930	30.7	20.4	30.6
11	0.110	141.2	167.4	17.9	12	0.895	37.8	22.9	28.3
16	0.224	123.5	161.6	28.3	17	0.857	44.4	24.3	27.4
21	0.333	109.6	158.4	32.6	22	0.815	51.0	25.0	27.5
26	0.429	98.1	156.0	33.5	27	0.765	57.9	25.3	28.8
31	0.511	88.8	154.2	33.0	Oct. 2	0.706	65.6	25.0	31.2
Apr. 5	0.582	80.5	152.5	32.5	7	0.630	74.9	24.7	34.9
10	0.648	72.8	151.3	32.7	12	0.530	86.5	24.3	38.4
15	0.712	65.0	150.5	33.9	17	0.397	101.9	24.4	40.2
20	0.777	56.4	150.3	36.5	22	0.231	122.6	25.4	27.0
25	0.844	46.5	150.6	41.0	27	0.065	150.4	28.0	13.4
30	0.913	34.4	151.8	47.7	Nov. 1	0.002	174.7	191.2	0.5
May 5	0.972	19.3	154.5	56.4	6	0.126	138.5	206.3	27.4
10	1.000	1.4	175.6	64.6	11	0.380	106.3	206.9	56.5
15	0.972	19.4	339.1	67.9	16	0.579	80.9	206.1	60.6
20	0.884	39.8	344.2	64.0	21	0.736	61.8	204.3	52.1
25	0.765	58.0	349.1	55.8	26	0.838	47.5	201.6	42.3
30	0.642	73.5	354.0	47.5	Dec. 1	0.902	36.5	198.0	35.1
June 4	0.522	86.7	358.5	40.9	6	0.941	25.1	193.4	30.0
9	0.426	98.5	2.6	35.6	11	0.968	20.8	187.6	26.8
14	0.331	109.7	6.4	31.0	16	0.964	14.5	179.4	25.1
19	0.241	121.2	10.1	25.9	21	0.994	9.0	165.8	24.5
24	0.160	133.6	14.3	20.1	26	0.998	4.9	123.6	25.0
29	0.079	147.3	21.2	11.5	31	0.998	5.7	41.8	26.7
34	0.026	161.6	38.5	4.1					

## NOTATION.

$k$ , the ratio of the illuminated portion of the apparent disk to the entire apparent disk considered as the superficies of a circle.

$i$ , the angle between the sun and earth, as seen from the planet.

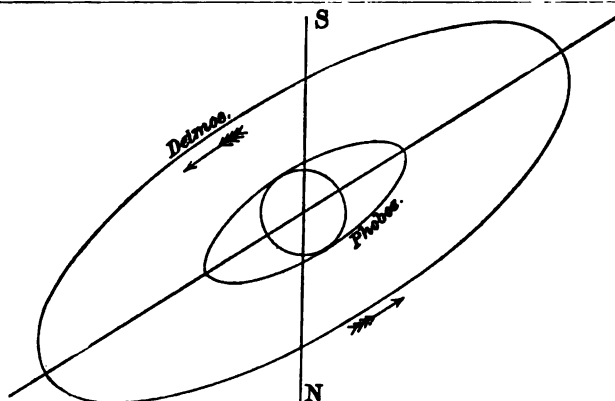
$\theta$ , the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

$L$ , the brilliancy of the disk. The unit of  $L$  is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the sun, and illuminated by the latter as the mean disk of the planet is illuminated.

## FOR WASHINGTON MEAN NOON.

Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>
Jan. 1	0.643	73.4	196.1	110.5	July 4	0.999	2.7	200.4	43.9
6	0.662	71.1	194.0	105.1	9	1.000	0.8	239.2	47.0
11	0.681	68.8	191.7	100.1	14	1.000	1.5	321.9	47.0
16	0.699	66.6	189.3	95.6	19	0.999	3.4	346.7	47.1
21	0.715	64.5	186.7	91.4	24	0.998	5.3	356.3	47.2
26	0.732	62.4	183.9	87.6	29	0.996	7.3	2.0	47.4
31	0.747	60.4	181.1	84.0	Aug. 3	0.994	9.3	6.0	47.6
Feb. 5	0.762	58.4	178.3	80.6	8	0.991	11.2	9.3	47.9
10	0.777	56.4	175.5	77.5	13	0.987	13.1	11.8	48.2
15	0.790	54.5	172.7	74.7	18	0.983	15.0	14.0	48.5
20	0.803	52.6	169.9	72.1	23	0.979	16.9	15.9	48.9
25	0.816	50.8	167.3	69.7	28	0.974	18.8	17.3	49.3
Mar. 1	0.828	48.9	164.8	67.4	Sept. 2	0.968	20.7	18.4	49.8
6	0.840	47.1	162.6	65.3	7	0.962	22.5	19.2	50.3
11	0.851	45.3	160.5	63.4	12	0.956	24.3	19.8	50.9
16	0.862	43.4	158.7	61.7	17	0.949	26.2	20.1	51.6
21	0.873	41.6	157.1	60.1	22	0.942	28.0	20.1	52.3
26	0.883	39.9	155.8	58.6	27	0.934	29.8	19.9	53.1
31	0.892	38.1	154.7	57.3	Oct. 2	0.926	31.6	19.3	53.9
Apr. 5	0.902	36.3	153.9	56.1	7	0.918	33.3	18.5	54.8
10	0.911	34.5	153.3	54.9	12	0.910	35.1	17.4	55.9
15	0.920	32.7	153.0	53.9	17	0.901	36.8	16.1	57.0
20	0.928	30.9	153.0	52.9	22	0.891	38.6	14.5	58.2
25	0.936	29.1	153.2	52.0	27	0.882	40.4	12.7	59.5
30	0.944	27.3	153.7	51.2	Nov. 1	0.871	42.1	10.6	60.9
May 5	0.951	25.5	154.5	50.5	6	0.861	43.9	8.3	62.4
10	0.958	23.7	155.6	49.9	11	0.850	45.6	6.0	64.1
15	0.964	21.8	157.1	49.4	16	0.839	47.4	3.5	65.9
20	0.970	20.0	158.8	48.9	21	0.827	49.2	1.0	67.9
25	0.975	18.1	160.8	48.5	26	0.815	51.0	358.4	70.0
30	0.980	16.2	163.2	48.1	Dec. 1	0.803	52.8	355.8	72.3
June 4	0.984	14.3	165.9	47.8	6	0.789	54.6	353.3	74.7
9	0.988	12.4	168.9	47.5	11	0.776	56.5	351.0	77.4
14	0.991	10.5	172.5	47.3	16	0.763	58.4	348.7	80.3
19	0.994	8.6	176.7	47.1	21	0.747	60.4	346.6	83.5
24	0.997	6.6	182.0	47.0	26	0.732	62.3	344.7	87.0
29	0.998	4.6	188.5	46.9	31	0.716	64.3	342.9	90.7





APPARENT ORBITS OF THE SATELLITES OF MARS IN MARCH AND APRIL, 1888,  
AS SEEN IN AN INVERTING TELESCOPE.

The circle represents the disk of the planet and is on the same scale as the orbits. The mean motions of the satellites are not yet (August, 1884) sufficiently well determined to enable the times of greatest elongation to be very accurately predicted.

#### WASHINGTON MEAN TIMES OF GREATEST ELONGATION.

PHOBOS.						DEIMOS.					
	d	h		d	h		d	h		d	h
March	20	0.0 E.	April	5	17.7 W.	April	22	11.4 E.	March	17	6.9 W.
	21	2.7 W.		6	20.5 E.		23	14.1 W.		19	4.3 E.
	22	5.5 E.		7	23.2 W.		24	16.9 E.		21	1.7 W.
	23	8.3 W.		9	2.0 E.		25	19.7 W.		22	23.1 E.
	24	11.1 E.		10	4.8 W.		26	22.5 E.		24	20.5 W.
	25	13.9 W.		11	7.6 E.		28	1.3 W.		26	17.9 E.
	26	16.7 E.		12	10.4 W.		29	4.1 E.		28	15.3 W.
	27	19.4 W.		13	13.1 E.		30	6.8 W.		30	12.7 E.
	28	22.2 E.		14	15.9 W.	May	1	9.6 E.	April	1	10.1 W.
	30	1.0 W.		15	18.7 E.		2	12.4 W.		3	7.5 E.
	31	3.8 E.		16	21.5 W.		3	15.2 E.		5	4.9 W.
April	1	6.6 W.		18	0.2 E.		4	18.0 W.		7	2.3 E.
	2	9.3 E.		19	3.0 W.		5	20.7 E.		8	23.7 W.
	3	12.1 W.		20	5.8 E.		6	23.5 W.		10	21.1 E.
	4	14.9 E.		21	8.6 W.		8	2.3 E.		12	18.4 W.
Date.	d	h	Position Angle.	Distance.		Date.	d	h	Position Angle.	Distance.	
March	20	0.0	126.4	19.0		March	17	6.9	305.2	46.7	
April	3	12.1	305.6	20.7		April	3	7.5	124.3	51.9	
April	22	11.4	123.7	21.1		April	24	2.8	302.2	53.0	
May	6	23.5	302.5	20.1		May	11	3.4	120.8	49.1	

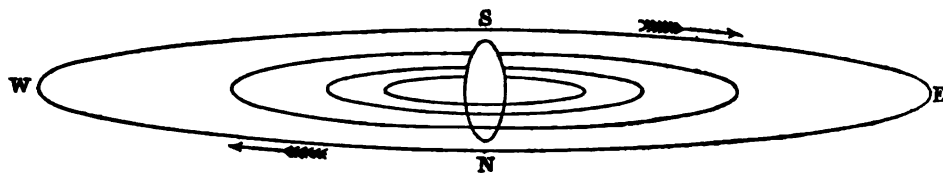
For Phobos every seventh eastern and western elongation is given, and for Deimos every third; the intermediate ones may be found with sufficient accuracy by adding the periodic time of each satellite.

Periodic time of Phobos,  $0^d 7^h 39^m 13^s.937$ . Periodic time of Deimos,  $1^d 6^h 17^m 54^s.377$ .

#### APPARENT DISK OF MARS.

January	31,	0.911	May	30,	0.919	September	28,	0.880
March	1,	0.945	June	29,	0.878	October	28,	0.897
March	31,	0.994	July	29,	0.864	November	26,	0.916
April	30,	0.981	August	28,	0.868	December	26,	0.935

The numbers in this table are the versed sines of the illuminated disk, the apparent diameter of the planet being taken as unity.



**APPARENT ORBITS OF THE SATELLITES OF JUPITER IN 1888,  
AS SEEN IN AN INVERTING TELESCOPE.**

*(The vertical scale is two and one-half times the horizontal one.)*

The object of this figure is to facilitate the identification of the satellites in cases where the diagrams of configurations do not suffice for that purpose: reference to the above diagram enables one to identify the inner and outer satellite of the pair. The central, vertical ellipse represents the disk of Jupiter, elongated two and one-half times in the vertical direction to correspond to the representation of the orbits of the satellites.

Facing each page of the phenomena of Jupiter's satellites, pages 456—479, is the page of diagrams of configurations, for the same month. The light disks ○ in the vertical row in the middle of the page represent the relative position of Jupiter each day. The dots adjacent in the same horizontal space represent the positions of the several satellites on the same day, at the hour and minute of Washington mean time indicated above the diagrams. The latitudes of the satellites are always considered zero in constructing the diagrams, except where two or more satellites chance to be at nearly the same distance from the planet, when they are placed one above the other according to their apparent latitudes. The numerals designating the satellites are placed on the right or left hand side of the dot, according as the motion of the satellite, for the time of the configuration, is toward the east or toward the west—the motion being always toward the numeral. Frequently, at the epoch of the configuration, one or more satellites will be invisible, being projected on the disk of the planet: this phenomenon is indicated by a light disk ○ at the left hand side of the page. Frequently, also, one or more satellites will be invisible, being concealed in occultation behind the disk, or eclipsed in the shadow of the planet: this phenomenon is indicated by a dark disk ● at the right hand side of the page. In both cases, the annexed numeral serves to point out which satellite is thus rendered invisible.

When an observation is made at a different hour from that for which the diagram is constructed, the motion of the satellite during the interval may be judged by transferring its given position to the above diagram, and estimating its motion during the elapsed interval on the above diagram of the orbits, by means of the following table of the periods:—

**MEAN SYNODIC PERIODS OF THE SATELLITES.**

	d	h	m	s	=	d
I.	1	18	28	35.945	=	1.76986048
II.	3	13	17	53.735	=	3.55409416
III.	7	3	59	35.854	=	7.16638720
IV.	16	18	5	6.928	=	16.75355241

## WASHINGTON MEAN TIMES OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE I.

Jan.	1	<sup>h</sup> <sup>m</sup> 3 13.3	March	22	<sup>h</sup> <sup>m</sup> 13 15.7	June	11	<sup>h</sup> <sup>m</sup> 21 26.8	Sept.	1	<sup>h</sup> <sup>m</sup> 6 39.5
	2	21 43.2		24	7 43.0		13	15 53.1		3	1 8.7
	4	16 13.0		26	2 10.3		15	10 19.4		4	19 37.9
	6	10 42.7		27	20 37.4		17	4 45.7		6	14 7.2
	8	5 12.4		29	15 4.6		18	23 12.1		8	8 36.5
	9	23 42.1		31	9 31.7		20	17 38.6		10	3 5.8
	11	18 11.8	April	2	3 58.7		22	12 5.1		11	21 35.2
	13	12 41.3		3	22 25.5		24	6 31.7		13	16 4.6
	15	7 10.9		5	16 52.5		26	0 58.3		15	10 34.1
	17	1 40.4		7	11 19.2		27	19 24.9		17	5 3.6
	18	20 10.0		9	5 45.9		29	13 51.8		18	23 33.2
	20	14 39.3		11	0 12.6	July	1	8 18.6		20	18 2.9
	22	9 8.8		12	18 39.2		3	2 45.5		22	12 32.4
	24	3 38.2		14	13 5.8		4	21 12.6		24	7 2.0
	25	22 7.6		16	7 32.3		6	15 39.5		26	1 31.7
	27	16 36.8		18	1 58.7		8	10 6.6		27	20 1.5
	29	11 6.0		19	20 25.1		10	4 33.7		29	14 31.3
Feb.	31	5 35.1		21	14 51.4		11	23 0.9	Oct.	1	9 1.2
	2	0 4.3		23	9 17.7		13	17 28.2		3	3 31.1
	3	18 33.3		25	3 44.0		15	11 55.6		4	22 0.9
	5	13 2.4		26	22 10.2		17	6 23.0		6	16 30.8
	7	7 31.3		28	16 36.3		19	0 50.5		8	11 0.8
	9	2 0.3	May	30	11 2.5		20	19 18.1		10	5 30.7
	10	20 29.1		2	5 28.6		22	13 45.8		12	0 0.7
	12	14 57.9		3	23 54.7		24	8 13.4		13	18 30.6
	14	9 26.6		5	18 20.8		26	2 41.2		15	13 0.7
	16	3 55.3		7	12 46.8		27	21 9.1		17	7 30.7
	17	22 23.9		9	7 12.7		29	15 37.0		19	2 0.9
	19	16 52.5		11	1 38.7		31	10 4.9		20	20 31.0
	21	11 21.0		12	20 4.6	Aug.	2	4 33.0		22	15 1.2
	23	5 49.5		14	14 30.5		3	23 1.1		24	9 31.3
	25	0 17.8		16	8 58.4		5	17 29.3		26	4 1.5
	26	18 46.1		18	3 22.3		7	11 57.6		27	22 31.7
	28	13 14.3		19	21 48.3		9	6 25.8		29	17 2.0
March	1	7 42.6		21	16 14.3		11	0 54.2		31	11 32.2
	3	2 10.7		23	10 40.2		12	19 22.7	Nov.	2	6 2.4
	4	20 38.8		25	5 6.2		14	13 51.3		4	0 32.7
	6	15 6.8		26	23 32.2		16	8 19.9		5	19 3.1
	8	9 34.8		28	17 58.1		18	2 48.5		7	13 33.4
	10	4 2.6		30	12 24.0		19	21 17.2		9	8 3.7
	11	22 30.4	June	1	6 50.0		21	15 46.0		11	2 34.0
	13	16 58.0		3	1 18.0		23	10 14.9		12	21 4.4
	15	11 25.8		4	19 42.2		25	4 43.8		14	15 34.8
	17	5 53.3		6	14 8.3		26	23 12.7		16	10 5.1
	19	0 20.8		8	8 34.5		28	17 41.5			
	20	18 48.3		10	3 0.7		30	12 10.5			

## WASHINGTON MEAN TIMES OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE II.

Jan.	2	h m 0 42.7	March	23	h m 18 34.5	June	13	h m 8 58.7	Sept.	3	h m 1 41.0	
	5	14 4.6		27	7 46.9		16	22 8.1		6	15 1.5	
	9	3 26.2		30	20 58.9		20	11 17.1		10	4 23.5	
	12	16 47.6		April	3		10 10.3	24		0 27.5	13	17 44.8
	16	6 8.7		6	23 21.3		27	13 37.5		17	7 7.4	
	19	19 29.4		10	12 31.7	July	1	2 48.9		20	20 29.4	
	23	8 49.9		14	1 41.8		4	15 59.9		24	9 52.7	
	26	22 9.9		17	14 51.2		8	5 12.4		27	23 15.4	
	30	11 29.7		21	4 0.5		11	18 24.4		Oct.	1	12 39.2
	Feb.	3		0 49.0	24		17 9.1	15		7 38.0	5	2 2.4
	6	14 8.0	May	28	6 17.8		18	20 51.2		8	15 26.8	
	10	3 26.6		1	19 25.7		22	10 6.0		12	4 50.5	
	13	16 44.8		5	8 33.8		25	23 20.3		15	18 15.3	
	17	6 2.6		8	21 41.2		29	12 36.4		19	7 39.4	
	20	19 20.0		12	10 49.1		Aug.	2		1 51.9	22	21 4.4
	24	8 36.9		15	23 56.3		5	15 9.1	Nov.	26	10 28.8	
	27	21 53.3		19	13 4.0		9	4 25.8		29	23 54.1	
	2	11 9.3		23	2 11.1		12	17 44.1		2	13 18.7	
	6	0 24.8		26	15 18.9		16	7 1.8		6	2 44.2	
	9	13 39.7		30	4 26.1		19	20 21.2		9	16 9.1	
March	13	2 54.1	June	2	17 34.2		23	9 39.9		13	5 34.5	
	16	16 8.1		6	6 41.8		26	23 0.2		16	18 59.5	
	20	5 21.5		9	19 50.5		30	12 19.8		20	8 25.0	

## SATELLITE III.

		<div>h m</div>		<div>h m</div>		<div>h m</div>		<div>h m</div>
Jan.	5	15 24.6	March	31	15 25.8	June	25	7 49.2
	12	19 42.9	April	7	18 59.2	July	2	11 17.7
	19	23 59.1		14	22 28.8		9	14 50.7
	27	4 12.2		22	1 54.1		16	18 28.3
Feb.	3	8 22.2		29	5 16.1		23	22 10.2
	10	12 29.3	May	6	8 35.3		31	1 56.0
	17	16 33.0		13	11 52.5	Aug.	7	5 46.4
	24	20 33.0		20	15 9.2		14	9 40.9
March	3	0 28.6		27	18 25.9		21	13 39.5
	10	4 19.9	June	3	21 44.1		28	17 42.4
	17	8 6.3		11	1 3.3	Sept.	4	21 48.8
	24	11 48.2		18	4 24.9		12	1 59.0

## SATELLITE IV.

		h	m			h	m			h	m			h	m
Jan.	10	13	30.2	April	3	7	23.2	June	25	8	43.3	Sept.	16	23	11.1
	27	8	59.6		19	22	44.1	July	12	0	14.7	Oct.	3	18	45.2
Feb.	13	3	51.3	May	6	13	22.6		28	16	40.4		20	14	47.2
	29	21	56.3		23	3	38.5	Aug.	14	10	1.9	Nov.	6	11	10.2
March	17	15	8.1	June	8	17	57.1		31	4	14.2		23	7	47.4

## WASHINGTON MEAN TIME.

## JANUARY.

d	h	m	s		d	h	m	s		d	h	m	s	
1	1	18	43.1	I. Ec. Dis.	10	22	3		I. Tr. Eg.	21	11	55		I. Sh. Eg.
	4	20		I. Oc. Re.		23	21		II. Tr. Eg.		12	59		I. Tr. Eg.
	20	43		III. Sh. In.	11	16	9	18.4	I. * Ec. Dis.		12	59		II. Tr. In.
	21	49	25.4	II. Ec. Dis.		19	18		I. Oc. Re.		13	21		II. Sh. Eg.
	22	29		III. Sh. Eg.	12	13	21		I. Sh. In.		15	28		II. Tr. Eg.
	22	31		I. Sh. In.		13	38	58.5	II. Ec. Dis.	22	6	59	43.4	I. Ec. Dis.
	23	23		I. Tr. In.		14	20		I. Tr. In.		10	15		I. Oc. Re.
2	0	9		III. Tr. In.		14	57	46.8	III. Ec. Dis.	23	4	10		I. Sh. In.
	0	44		I. Sh. Eg.		15	33		I. Sh. Eg.		5	16		I. Tr. In.
	1	35		I. Tr. Eg.		16	28	0.2	III. * Ec. Re.		5	28	23.4	II. Ec. Dis.
	1	58		II. Oc. Re.		16	32		I. * Tr. Eg.		6	23		I. Sh. Eg.
	1	59		III. Tr. Eg.		18	2		II. * Oc. Re.		7	28		I. Tr. Eg.
	19	47	7.2	I. Ec. Dis.		18	50		III. Oc. Dis.		8	35		III. Sh. In.
	22	49		I. Oc. Re.		20	36		III. Oc. Re.		10	4		II. Oc. Re.
3	16	21		II. Sh. In.	13	10	37	38.5	I. Ec. Dis.		10	21		III. Sh. Eg.
	16	59		I. * Sh. In.		13	47		I. Oc. Re.		13	3		III. Tr. In.
	17	53		I. * Tr. In.	14	7	49		I. Sh. In.		14	46		III. Tr. Eg.
	18	5		II. * Tr. In.		8	15		II. Sh. In.	24	1	28	4.4	I. Ec. Dis.
	18	51		II. Sh. Eg.		8	49		I. Tr. In.		4	44		I. Oc. Re.
	19	12		I. Sh. Eg.		10	1		I. Sh. Eg.		22	38		I. Sh. In.
	20	5		I. Tr. Eg.		10	14		II. Tr. In.		23	45		I. Tr. In.
	20	35		II. Tr. Eg.		10	45		II. Sh. Eg.	25	0	9		II. Sh. In.
4	14	15	36.4	I. Ec. Dis.		11	1		I. Tr. Eg.		0	51		I. Sh. Eg.
	17	19		I. * Oc. Re.		12	43		II. Tr. Eg.		1	58		I. Tr. Eg.
5	10	59	59.2	III. Ec. Dis.	15	5	6	6.5	I. Ec. Dis.		2	21		II. Tr. In.
	11	5	58.4	II. Ec. Dis.		8	17		I. Oc. Re.		2	39		II. Sh. Eg.
	11	27		I. Sh. In.	16	2	17		I. Sh. In.		4	50		II. Tr. Eg.
	12	22		I. Tr. In.		2	55	27.7	II. Ec. Dis.		19	56	31.9	I. Ec. Dis.
	12	30	0.8	III. Ec. Re.		3	19		I. Tr. In.		23	14		I. Oc. Re.
	13	40		I. Sh. Eg.		4	29		I. Sh. Eg.	26	17	6		I. * Sh. In.
	14	30		III. Oc. Dis.		4	38		III. Sh. In.		18	14		I. * Tr. In.
	14	34		I. Tr. Eg.		5	31		I. Tr. Eg.		18	44	49.9	II. Ec. Dis.
	15	20		II. Oc. Dis.		6	23		III. Sh. Eg.		19	19		I. Sh. Eg.
	16	19		III. Oc. Re.		7	23		II. Oc. Re.		20	27		I. Tr. Eg.
6	8	43	57.6	I. Ec. Dis.		8	47		III. Tr. In.		22	52	50.4	III. Ec. Dis.
	11	49		I. Oc. Re.		10	32		III. Tr. Eg.		23	24		II. Oc. Re.
7	5	39		II. Sh. In.		23	34	28.6	I. Ec. Dis.	27	0	23	36.6	III. Ec. Re.
	5	56		I. Sh. In.	17	2	46		I. Oc. Re.		3	21		III. Oc. Dis.
	6	52		I. Tr. In.		20	45		I. Sh. In.		5	3		III. Oc. Re.
	7	28		II. Tr. In.		21	33		II. Sh. In.		14	24	50.9	I. Ec. Dis.
	8	9		II. Sh. Eg.		21	48		I. Tr. In.		17	43		I. * Oc. Re.
	8	9		I. Sh. Eg.		22	58		I. Sh. Eg.	28	11	35		I. Sh. In.
	9	4		I. Tr. Eg.		23	37		II. Tr. In.		12	43		I. Tr. In.
	9	58		II. Tr. Eg.	18	0	0		I. Tr. Eg.		13	27		II. Sh. In.
8	3	12	26.6	I. Ec. Dis.		0	3		II. Sh. Eg.		13	47		I. Sh. Eg.
	6	19		I. Oc. Re.		2	6		II. Tr. Eg.		14	56		I. Tr. Eg.
9	0	22	29.0	II. Ec. Dis.		18	2	56.4	I. * Ec. Dis.		15	43		II. * Tr. In.
	0	24		I. Sh. In.		21	16		I. Oc. Re.		15	57		II. * Sh. Eg.
	0	40		III. Sh. In.	19	15	13		I. Sh. In.		18	11		II. * Tr. Eg.
	1	21		I. Tr. In.		16	11	55.4	II. * Ec. Dis.	29	8	53	17.1	I. Ec. Dis.
	2	26		III. Sh. Eg.		16	17		I. * Tr. In.		12	12		I. Oc. Re.
	2	37		I. Sh. Eg.		17	26		I. * Sh. Eg.	30	6	3		I. Sh. In.
	3	32		I. Tr. Eg.		18	29		I. Tr. In.		7	12		I. Tr. In.
	4	29		III. Tr. In.		18	55	32.6	III. Ec. Dis.		8	1	17.6	II. Ec. Dis.
	4	41		II. Oc. Re.		20	26	1.2	III. Ec. Re.		8	15		I. Sh. Eg.
	6	16		III. Tr. Eg.		20	44		II. Oc. Re.		9	25		I. Tr. Eg.
	21	40	49.6	I. Ec. Dis.		23	7		III. Oc. Dis.		12	33		III. Sh. In.
10	0	48		I. Oc. Re.	20	0	51		III. Oc. Re.		12	44		II. Oc. Re.
	18	52		I. Sh. In.		12	31	16.1	I. Ec. Dis.		14	19		III. Sh. Eg.
	18	57		II. Sh. In.		15	45		I. * Oc. Re.		17	16		III. * Tr. In.
	19	51		I. Tr. In.	21	9	41		I. Sh. In.		18	57		III. Tr. Eg.
	20	51		II. Tr. In.		10	47		I. Tr. In.	31	3	21	37.9	I. Ec. Dis.
	21	5		I. Sh. Eg.		10	51		II. Sh. In.		6	41		I. Oc. Re.
	21	27		II. Sh. Eg.										



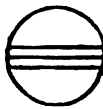
NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

JANUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

<p>I.</p> <p>d</p> 	<p>II.</p> <p>d</p> 	<p>III.</p> <p>d r</p> 
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*Configurations at 17<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.		East.	
1		2	1	
2		3 4 1	2	
3		3 4	1	
4	4	3 2		1
5	4	1	2	3
6	4		1 2 3	
7	4	1 2		3
8	4	2	1 2	
9		4 3 1	2	
10	3		1 2	
11		3 2	4	1
12		1 2	4	2
13			1 2 3	4
14		1 2	3	4
15		2	1 3	4
16		1 2	2	4
17		3	1 2	4
18		3 2 1	4	
19	1	4 3		2
20		4	1 2	
21	4	1 2		3
22	4	2	1 3	
23	4	1 3	2	
24	4	3	1 2	
25		4 3 2 1		
26		4 3	1	
27			4 3 2	1
28	2	1	4 3	
29		2	1 3	4
30	3	1	2	4
31		3	1 2	4

## WASHINGTON MEAN TIME.

## FEBRUARY.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	0	31		I. Sh. In.	10	11	40		III. Oc. Dis.	20	15	9		I. * Tr. Eg.					
	1	41		I. Tr. In.		13	18		III. Oc. Re.		15	40	5.9	II. * Ec. Dis.					
	2	43		I. Sh. Eg.		18	11	52.5	I. Ec. Dis.		20	33		II. Oc. Re.					
	2	45		II. Sh. In.		21	35		I. Oc. Re.	21	0	24		III. Sh. In.					
	3	54		I. Tr. Eg.	11	15	20		I. * Sh. In.		2	11		III. Sh. Eg.					
	5	4		II. Tr. In.		16	35		I. * Tr. In.		5	32		III. Tr. In.					
	5	15		II. Sh. Eg.		17	32		I. * Sh. Eg.		7	8		III. Tr. Eg.					
	7	32		II. Tr. Eg.		18	39		II. Sh. In.		9	2	4.4	I. Ec. Dis.					
	21	50	4.5	I. Ec. Dis.		18	47		I. Tr. Eg.		12	27		I. Oc. Re.					
9	1	10		I. Oc. Re.		21	5		II. Tr. In.	22	6	9		I. Sh. In.					
	19	0		I. Sh. In.		21	9		II. Sh. Eg.		7	26		I. Tr. In.					
	20	10		I. Tr. In.		23	32		II. Tr. Eg.		8	22		I. Sh. Eg.					
	21	12		I. Sh. Eg.	12	12	40	17.6	I. Ec. Dis.		9	37		I. Tr. Eg.					
	21	17	43.6	II. Ec. Dis.		16	4		I. * Oc. Re.		10	32		II. Sh. In.					
	22	23		I. Tr. Eg.	13	9	49		I. Sh. In.		13	2		II. Sh. Eg.					
	2	3		II. Oc. Re.		11	3		I. Tr. In.		13	2		II. Tr. In.					
	2	50	4.3	III. Ec. Dis.		12	1		I. Sh. Eg.		15	29		II. * Tr. Eg.					
	4	21	10.5	III. Ec. Re.		13	7	7.4	II. Ec. Dis.	23	3	30	29.6	I. Ec. Dis.					
	7	32		III. Oc. Dis.		13	15		I. Tr. Eg.		6	55		I. Oc. Re.					
	9	12		III. Oc. Re.		17	58		II. * Oc. Re.	24	0	38		I. Sh. In.					
	16	18	22.9	I. * Ec. Dis.		20	27		III. Sh. In.		1	54		I. Tr. In.					
	19	39		I. Oc. Re.		22	14		III. Sh. Eg.		2	51		I. Sh. Eg.					
4	13	28		I. Sh. In.	14	1	31		III. Tr. In.		4	5		I. Tr. Eg.					
	14	39		I. Tr. In.		3	8		III. Tr. Eg.		4	56	35.9	II. Ec. Dis.					
	15	40		I. * Sh. Eg.		7	8	37.5	I. Ec. Dis.		9	50		II. Oc. Re.					
	16	3		II. * Sh. In.		10	33		I. Oc. Re.		14	43	9.2	III. * Ec. Dis.					
	16	52		I. * Tr. Eg.	15	4	17		I. Sh. In.		16	15	29.0	III. * Ec. Re.					
	18	25		II. Tr. In.		5	32		I. Tr. In.		19	45		III. Oc. Dis.					
	18	33		II. Sh. Eg.		6	29		I. Sh. Eg.		21	21		III. Oc. Re.					
	20	53		II. Tr. Eg.		7	44		I. Tr. Eg.		21	58	47.0	I. Ec. Dis.					
5	10	46	48.5	I. Ec. Dis.		7	56		II. Sh. In.	25	1	24		I. Oc. Re.					
	14	8		I. Oc. Re.		10	24		II. Tr. In.		19	6		I. Sh. In.					
6	7	56		I. Sh. In.		10	26		II. Sh. Eg.		20	22		I. Tr. In.					
	9	8		I. Tr. In.		12	51		II. Tr. Eg.		21	19		I. Sh. Eg.					
	10	8		I. Sh. Eg.	16	1	37	3.1	I. Ec. Dis.		22	34		I. Tr. Eg.					
	10	34	11.6	II. Ec. Dis.		5	1		I. Oc. Re.		23	50		II. Sh. In.					
	11	21		I. Tr. Eg.		22	45		I. Sh. In.	26	2	20		II. Sh. Eg.					
	15	22		II. * Oc. Re.	17	0	0		I. Tr. In.		2	20		II. Tr. In.					
	16	30		III. * Sh. In.		0	57		I. Sh. Eg.		4	47		II. Tr. Eg.					
	18	16		III. Sh. Eg.		2	12		I. Tr. Eg.		16	27	11.1	I. * Ec. Dis.					
	21	25		III. Tr. In.		2	23	35.6	II. Ec. Dis.		19	52		I. Oc. Re.					
	23	4		III. Tr. Eg.		7	16		II. Oc. Re.	27	13	34		I. Sh. In.					
7	5	15	8.9	I. Ec. Dis.		10	45	5.7	III. Ec. Dis.		14	50		I. * Tr. In.					
	8	37		I. Oc. Re.		12	16	58.7	III. Ec. Re.		15	47		I. * Sh. Eg.					
8	2	24		I. Sh. In.		15	44		III. * Oc. Dis.		17	2		I. * Tr. Eg.					
	3	37		I. Tr. In.		17	21		III. * Oc. Re.		18	13	8.0	II. Ec. Dis.					
	4	36		I. Sh. Eg.		20	5	20.6	I. Ec. Dis.		23	7		II. Oc. Re.					
	5	21		II. Sh. In.		23	30		I. Oc. Re.	28	4	21		III. Sh. In.					
	5	49		I. Tr. Eg.	18	17	13		I. * Sh. In.		6	9		III. Sh. Eg.					
	7	45		II. Tr. In.		18	29		I. Tr. In.		9	30		III. Tr. In.					
	7	51		II. Sh. Eg.		19	26		I. Sh. Eg.		10	55	30.3	I. Ec. Dis.					
	10	13		II. Tr. Eg.		20	40		I. Tr. Eg.		11	5		III. Tr. Eg.					
	23	43	34.7	I. Ec. Dis.		21	14		II. Sh. In.		14	20		I. * Oc. Re.					
9	3	6		I. Oc. Re.		23	43		II. Tr. In.	29	8	3		I. Sh. In.					
	20	52		I. Sh. In.		23	44		II. Sh. Eg.		9	18		I. Tr. In.					
	22	6		I. Tr. In.	19	2	10		II. Tr. Eg.		10	15		I. Sh. Eg.					
	23	4		I. Sh. Eg.		14	33	44.9	I. * Ec. Dis.		11	30		I. Tr. Eg.					
	23	50	38.4	II. Ec. Dis.		17	59		I. * Oc. Re.		13	7		II. Sh. In.					
10	0	18		I. Tr. Eg.	20	11	41		I. Sh. In.		15	37		II. * Sh. Eg.					
	4	40		II. Oc. Re.		12	57		I. Tr. In.		15	37		II. * Tr. In.					
	6	47	36.6	III. Ec. Dis.		13	54		I. Sh. Eg.		18	4		II. Tr. Eg.					
	8	19	5.0	III. Ec. Re.															

Norm.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

FEBRUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 16<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1		·3	2·1	○			4·	
2			·3 ·2	○	1·		4·	
3				·1 ○	·3	·24·		
4	○ 1·			·1 ○	·3			
5			·4·	○	·1		3·	
6		4·		○	·2 3·			
7		4·	3·	○	·1 2·			
8	4·	3·	·1	○				
9	·4		·3 ·2	○	1·			
10		·4		·1 ○	·3	·2		
11		·4		1 ○	·2·	·3		
12		2·	·4	○		3·		·1 ●
13			1·	○	·4			·2 ●
14			3·	○	·1 2·	·4		
15		3·	1· 2·	○			·4	
16		·3 ·2		○	1·		·4	
17			·1	○	·2		4·	·3 ●
18				○	1· 2·	·3	4·	
19			2·	○		3· 4·		·1 ●
20				·1 ○	·4			
21			3· 4·	·1 ○	·2			
22		3· 4·	1· 2·	○				
23		4·	·3 ·2	○	·1			
24	4·		·1 ·3	○	·2			
25	4·			○	1· 2·	·3		
26	·4		2·	·1 ○		3·		
27	○ 1·	·4	·2	○	3·			
28		·4	3·	○	·1	·2		
29	○ 2·	3·	1· ·4	○				



## WASHINGTON MEAN TIME.

## MARCH.

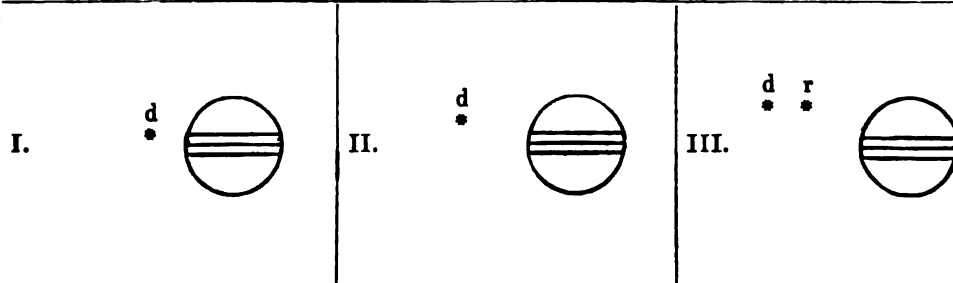
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	5	23	55.4	I. Ec. Dis.	11	7	31		II. Sh. Eg.	21	17	2		I. *Tr. Eg.					
	8	48		I. Oc. Re.		9	52		II. Tr. Eg.		20	53		II. Sh. In.					
2	2	31		I. Sh. In.		20	14	2.3	I. Ec. Dis.		23	10		II. Tr. In.					
	3	46		I. Tr. In.		23	36		I. Oc. Re.		23	23		II. Sh. Eg.					
	4	43		I. Sh. Eg.	12	17	20		I. *Sh. In.	22	1	36		II. Tr. Eg.					
	5	58		I. Tr. Eg.		18	33		I. Tr. In.		11	4	12.9	I. Ec. Dis.					
	7	29	41.3	II. Ec. Dis.		19	33		I. Sh. Eg.		14	21		I. *Oc. Re.					
	12	23		II. Oc. Re.		20	45		I. Tr. Eg.	23	8	10		I. Sh. In.					
	18	40	35.8	III. Ec. Dis.		23	19	31.5	II. Ec. Dis.		9	18		I. Tr. In.					
	20	13	24.2	III. Ec. Re.	13	4	7		II. Oc. Re.		10	22		I. Sh. Eg.					
	23	42		III. Oc. Dis.		12	15		III. Sh. In.		11	30		I. Tr. Eg.					
	23	52	12.8	I. Ec. Dis.		14	4		III. *Sh. Eg.		15	9	45.1	II. *Ec. Dis.					
3	1	15		III. Oc. Re.		14	42	21.3	I. *Ec. Dis.		19	47		II. Oc. Re.					
	3	17		I. Oc. Re.		17	14		III. *Tr. In.	24	5	32	31.4	I. Ec. Dis.					
	20	59		I. Sh. In.		18	4		I. Oc. Re.		6	32	14.5	III. Ec. Dis.					
	22	14		I. Tr. In.		18	45		III. Tr. Eg.		8	6	43.1	III. Ec. Re.					
	23	11		I. Sh. Eg.	14	11	48		I. Sh. In.		8	49		I. Oc. Re.					
4	0	26		I. Tr. Eg.		13	1		I. *Tr. In.		11	4		III. Oc. Dis.					
	2	25		II. Sh. In.		14	1		I. *Sh. Eg.		12	33		III. *Oc. Re.					
	4	54		II. Tr. In.		15	13		I. *Tr. Eg.	25	2	38		I. Sh. In.					
	4	55		II. Sh. Eg.		18	18		II. Sh. In.		3	45		I. Tr. In.					
	7	21		II. Tr. Eg.		20	41		II. Tr. In.		4	50		I. Sh. Eg.					
	18	20	36.7	I. Ec. Dis.		20	48		II. Sh. Eg.		5	57		I. Tr. Eg.					
	21	45		I. Oc. Re.		23	7		II. Tr. Eg.		10	11		II. Sh. In.					
5	15	28		I. *Sh. In.	15	9	10	46.5	I. Ec. Dis.		12	23		II. *Tr. In.					
	16	42		I. *Tr. In.		12	32		I. *Oc. Re.		12	41		II. *Sh. Eg.					
	17	40		I. Sh. Eg.	16	6	17		I. Sh. In.		14	49		II. *Tr. Eg.					
	18	54		I. Tr. Eg.		7	28		I. Tr. In.	26	0	0	55.4	I. Ec. Dis.					
	20	46	16.1	II. Ec. Dis.		8	30		I. Sh. Eg.		3	16		I. Oc. Re.					
6	1	38		II. Oc. Re.		9	40		I. Tr. Eg.		21	7		I. Sh. In.					
	8	18		III. Sh. In.		12	36	14.6	II. *Ec. Dis.		22	12		I. Tr. In.					
	10	6		III. Sh. Eg.		17	21		II. *Oc. Re.		23	19		I. Sh. Eg.					
	12	48	55.8	I. Ec. Dis.	17	2	35	8.5	III. Ec. Dis.	27	0	24		I. Tr. Eg.					
	13	24		III. *Tr. In.		3	39	4.4	I. Ec. Dis.		4	26	30.7	II. Ec. Dis.					
	14	57		III. *Tr. Eg.		4	9	1.5	III. Ec. Re.		9	0		II. Oc. Re.					
	16	13		I. *Oc. Re.		6	59		I. Oc. Re.		18	29	15.6	I. Ec. Dis.					
7	9	56		I. Sh. In.		7	21		III. Oc. Dis.		20	10		III. Sh. In.					
	11	10		I. Tr. In.		8	51		III. Oc. Re.		21	43		I. Oc. Re.					
	12	8		I. Sh. Eg.	18	0	45		I. Sh. In.		22	0		III. Sh. Eg.					
	13	22		I. *Tr. Eg.		1	56		I. Tr. In.	28	0	39		III. Tr. In.					
	15	43		II. *Sh. In.		2	58		I. Sh. Eg.		2	8		III. Tr. Eg.					
	18	10		II. Tr. In.		4	8		I. Tr. Eg.		15	35		I. *Sh. In.					
	18	13		II. Sh. Eg.		7	36		II. Sh. In.		16	39		I. *Tr. In.					
	20	37		II. Tr. Eg.		9	56		II. Tr. In.		17	47		I. Sh. Eg.					
8	7	17	20.6	I. Ec. Dis.		10	6		II. Sh. Eg.		18	51		I. Tr. Eg.					
	10	41		I. Oc. Re.		12	22		II. Tr. Eg.		23	28		II. Sh. In.					
9	4	24		I. Sh. In.		22	7	28.3	I. Ec. Dis.	29	1	36		II. Tr. In.					
	5	38		I. Tr. In.	19	1	27		I. Oc. Re.		1	58		II. Sh. Eg.					
	6	36		I. Sh. Eg.		19	13		I. Sh. In.		4	2		II. Tr. Eg.					
	7	49		I. Tr. Eg.		20	23		I. Tr. In.		12	57	41.4	I. *Ec. Dis.					
	10	2	53.8	II. Ec. Dis.		21	26		I. Sh. Eg.		16	10		I. *Oc. Re.					
	14	53		II. *Oc. Re.		22	35		I. Tr. Eg.	30	10	3		I. Sh. In.					
	22	38	3.7	III. Ec. Dis.		1	52	55.9	II. Ec. Dis.		11	6		I. Tr. In.					
10	0	11	23.1	III. Ec. Re.		6	34		II. Oc. Re.		12	15		I. *Sh. Eg.					
	1	45	38.3	I. Ec. Dis.		16	13		III. *Sh. In.		13	1		I. *Tr. Eg.					
	3	34		III. Oc. Dis.		16	35	47.7	I. *Ec. Dis.		17	43	26.8	II. Ec. Dis.					
	5	6		III. Oc. Re.		18	2		III. Sh. Eg.		22	12		II. Oc. Re.					
	5	9		I. Oc. Re.		19	54		I. Oc. Re.		7	26	0.2	I. Ec. Dis.					
	22	52		I. Sh. In.		20	59		III. Tr. In.	31	10	29	45.9	III. Ec. Dis.					
11	0	5		I. Tr. In.		22	29		III. Tr. Eg.		10	37		I. Oc. Re.					
	1	5		I. Sh. Eg.	21	13	42		I. *Sh. In.		12	4	51.9	III. *Ec. Re.					
	2	17		I. Tr. Eg.		14	50		I. *Tr. In.		14	42		III. *Oc. Dis.					
	5	1		II. Sh. In.		15	54		I. *Sh. Eg.		16	10		III. *Oc. Re.					
	7	26		II. Tr. In.															

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

## MARCH.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 15<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1		3	2	○	1	4		
2			1 3	○	2		4	
3				○	1 3		4	
4			2 1	○		3	4	
5			2	○	1	3	4	
6	○ 3			○	2		4	1 ●
7		3	1	○	2		4	
8		3 2		○	1	4		
9			1 4	○	2			
10		4		○	1 3			
11		4		○		3		
12		4	2	○	1	3		
13		4		○	3	2		1 ●
14	○ 1	4	3	○	2			
15		4 3 2		○	1			
16			1	○				2 ●
17				○	3 1 2			
18			1 2	○		4 3		
19			2	○	1	3	4	
20				○	3 2		4	
21	○ 1		3	○	2		4	
22		3	2	○	1		4	
23			3 1 2	○			4	
24				○	3 1 2 4			
25			1 2	○	4		3	
26			2 4	○	1		3	
27		4		○		3		
28		4	3	○	1	2		
29		4	3 2	○				1 ●
30		4	3 2 1	○				
31		4		○	1 2			3 ●

## WASHINGTON MEAN TIME.

## APRIL.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	4	32		I. Sh. In.	11	4	5		III. Sh. In.	21	1	25	49.6		II. Ec. Dis.				
	5	33		I. Tr. In.		5	56		III. Sh. Eg.		5	13			II. Oc. Re.				
	6	44		I. Sh. Eg.		7	47		III. Tr. In.		13	6	43.6		I. * Ec. Dis.				
	7	45		I. Tr. Eg.		9	14		III. Tr. Eg.		15	57			I. * Oc. Re.				
	12	46		II. * Sh. In.		19	22		I. Sh. In.		22	23	7.8		III. Ec. Dis.				
	14	48		II. * Tr. In.		20	14		I. Tr. In.	22	0	0	17.4		III. Ec. Re.				
	15	16		II. * Sh. Eg.		21	34		I. Sh. Eg.		1	11			III. Oc. Dis.				
	17	14		II. Tr. Eg.		22	25		I. Tr. Eg.		2	37			III. Oc. Re.				
2	1	54	24.6	I. Ec. Dis.	13	4	38		II. Sh. In.		10	12			I. * Sh. In.				
	5	4		I. Oc. Re.		6	22		II. Tr. In.		10	53			I. * Tr. In.				
	23	0		I. Sh. In.		7	8		II. Sh. Eg.		12	25			I. * Sh. Eg.				
3	0	0		I. Tr. In.		8	47		II. Tr. Eg.		13	4			I. * Tr. Eg.				
	1	12		I. Sh. Eg.		16	44	44.7	I. * Ec. Dis.		20	31			II. Sh. In.				
	2	12		I. Tr. Eg.		19	45		I. Oc. Re.		21	51			II. Tr. In.				
	7	0	16.6	II. Ec. Dis.	13	13	50		I. * Sh. In.		23	1			II. Sh. Eg.				
	11	23		II. * Oc. Re.		14	41		I. * Tr. In.	23	0	16			II. Tr. Eg.				
	20	22	45.1	I. Ec. Dis.		16	3		I. * Sh. Eg.		7	35	10.2		I. Ec. Dis.				
	23	31		I. Oc. Re.		16	52		I. Tr. Eg.		10	23			I. * Oc. Re.				
4	0	8		III. Sh. In.		22	51	27.6	II. Ec. Dis.	24	4	40			I. Sh. In.				
	1	58		III. Sh. Eg.	14	2	54		II. Oc. Re.		5	19			I. Tr. In.				
	4	15		III. Tr. In.		11	13	5.5	I. * Ec. Dis.		6	53			I. Sh. Eg.				
	5	43		III. Tr. Eg.		14	12		I. * Oc. Re.		7	30			I. Tr. Eg.				
	17	28		I. Sh. In.		18	25	29.0	III. Ec. Dis.		14	42	55.4		II. * Ec. Dis.				
	18	27		I. Tr. In.		20	1	55.4	III. Ec. Re.		18	23			II. Oc. Re.				
	19	40		I. Sh. Eg.		21	46		III. Oc. Dis.	25	2	3	33.8		I. Ec. Dis.				
	20	39		I. Tr. Eg.		23	12		III. Oc. Re.		4	50			I. Oc. Re.				
5	2	3		II. Sh. In.	15	8	18		I. Sh. In.		12	0			III. * Sh. In.				
	4	0		II. Tr. In.		9	8		I. Tr. In.		13	52			III. * Sh. Eg.				
	4	33		II. Sh. Eg.		10	31		I. Sh. Eg.		14	38			III. * Tr. In.				
	5	26		II. Tr. Eg.		11	19		I. * Tr. Eg.		16	3			III. * Tr. Eg.				
	14	51	11.5	I. * Ec. Dis.		17	56		II. Sh. In.		23	8			I. Sh. In.				
	17	58		I. Oc. Re.		19	32		II. Tr. In.		23	45			I. Tr. In.				
6	11	57		I. * Sh. In.		20	26		II. Sh. Eg.	26	1	21			I. Sh. Eg.				
	12	54		I. * Tr. In.		21	57		II. Tr. Eg.		1	56			I. Tr. Eg.				
	14	9		I. * Sh. Eg.	16	5	41	31.3	I. Ec. Dis.		9	48			II. Sh. In.				
	15	5		I. * Tr. Eg.		8	38		I. Oc. Re.		11	0			II. * Tr. In.				
	20	17	20.5	II. Ec. Dis.	17	2	47		I. Sh. In.		12	18			II. * Sh. Eg.				
	0	34		II. Oc. Re.		3	34		I. Tr. In.		13	25			II. * Tr. Eg.				
	9	19	31.4	I. Ec. Dis.		5	0		I. Sh. Eg.		20	32	2.8		I. Ec. Dis.				
	12	25		I. * Oc. Re.		5	45		I. Tr. Eg.		23	16			I. Oc. Re.				
	14	27	17.8	III. * Ec. Dis.		12	8	27.9	II. * Ec. Dis.	27	17	37			I. Sh. In.				
	16	3	3.0	III. * Ec. Re.		16	4		II. * Oc. Re.		18	11			I. Tr. In.				
	18	15		III. Oc. Dis.	18	0	9	53.5	I. Ec. Dis.		19	50			I. Sh. Eg.				
	19	43		III. Oc. Re.		3	4		I. Oc. Re.		20	22			I. Tr. Eg.				
8	6	25		I. Sh. In.		8	2		III. Sh. In.	28	4	0	26.3		II. Ec. Dis.				
	7	21		I. Tr. In.		9	54		III. Sh. Eg.		7	30			II. Oc. Re.				
	8	37		I. Sh. Eg.		11	14		III. * Tr. In.		15	0	26.3		I. * Ec. Dis.				
	9	39		I. Tr. Eg.		12	40		III. * Tr. Eg.		17	42			I. Oc. Re.				
	15	21		II. * Sh. In.		21	15		I. Sh. In.	29	2	20	52.0		III. Ec. Dis.				
	17	11		II. Tr. In.		22	1		I. Tr. In.		3	58	46.6		III. Ec. Re.				
	17	51		II. Sh. Eg.		23	28		I. Sh. Eg.		4	33			III. Oc. Dis.				
	19	37		II. Tr. Eg.	19	0	12		I. Tr. Eg.		5	59			III. Oc. Re.				
9	3	47	56.2	I. Ec. Dis.		7	13		II. Sh. In.		12	5			I. * Sh. In.				
	6	52		I. Oc. Re.		8	42		II. Tr. In.		12	38			I. * Tr. In.				
10	0	53		I. Sh. In.		9	43		II. Sh. Eg.		14	18			I. * Sh. Eg.				
	1	48		I. Tr. In.		11	7		II. * Tr. Eg.		14	49			I. * Tr. Eg.				
	3	6		I. Sh. Eg.		18	38	21.6	I. Ec. Dis.		23	6			II. Sh. In.				
	3	59		I. Tr. Eg.		21	31		I. Oc. Re.	30	0	8			II. Tr. In.				
	9	34	15.3	II. Ec. Dis.	20	15	43		I. * Sh. In.		1	36			II. Sh. Eg.				
	13	44		II. * Oc. Re.		16	27		I. * Tr. In.		2	33			II. Tr. Eg.				
	22	16	17.7	I. Ec. Dis.		17	56		I. Sh. Eg.		9	28	53.7		I. * Ec. Dis.				
11	1	18		I. Oc. Re.		18	38		I. Tr. Eg.		12	8			I. * Oc. Re.				

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

APRIL.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

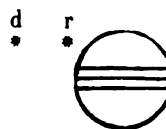
I.



II.



III.

*Configurations at 13<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1		4	1	2	3			
2		2	4	1	3			
3			1	2	3			
4			3	1	2	4		
5		3	2	1			4	
6	1		3	2				4
7				3	1	2		4
8			1	2	3			4
9			3		1	3	4	
10			1		3	4		2
11			3	4	1	2		
12			3	4	1			
13		4	3	2	1			
14		4		3		2		1
15	4			1	2	3		
16		4		2	1		3	
17		4		1		3		2
18			4	3	1	2		
19			3	1				
20			3	2	1	4		
21				3	2		4	1
22				1	2	3		4
23			2		1		3	4
24			1	2		3		4
25				3	1	2		4
26			3	1	2		4	
27			3	2		1	4	
28				3	1	2		
29	1		4			3	2	
30		4		2	1		3	

## WASHINGTON MEAN TIME.

## MAY.

d	h	m	s		d	h	m	s		d	h	m	s	
1	6	34		I. Sh. In.	11	0	19	39.4	I. Ec. Dis.	21	15	8		I. * Oc. Dis.
	7	4		I. Tr. In.		2	44		I. Oc. Re.		17	20		I. Oc. Re.
	8	47		I. Sh. Eg.		21	25		I. Sh. In.	22	12	15		I. * Tr. In.
	9	15		I. Tr. Eg.		21	40		I. Tr. In.		12	16		I. * Sh. In.
	17	17	38.2	II. Ec. Dis.		23	38		I. Sh. Eg.		14	27		I. * Tr. Eg.
	20	38		II. Oc. Re.		23	51		I. Tr. Eg.		14	29		I. * Sh. Eg.
2	3	57	18.3	I. Ec. Dis.	12	9	10	28.4	II. * Ec. Dis.	23	0	58		II. Oc. Dis.
	6	34		I. Oc. Re.		12	2		II. * Oc. Re.		3	28	3.1	II. Ec. Re.
	15	58		III. * Sh. In.		18	48	5.6	I. Ec. Dis.		9	34		I. * Oc. Dis.
	17	50		III. Sh. Eg.		21	10		I. Oc. Re.		11	46	57.9	I. * Ec. Re.
	17	58		III. Tr. In.	13	10	15	55.6	III. * Ec. Dis.	24	3	48		III. Tr. In.
	19	24		III. Tr. Eg.		12	37		III. * Oc. Re.		3	54		III. Sh. In.
3	1	2		I. Sh. In.		15	53		I. * Sh. In.		5	21		III. Tr. Eg.
	1	30		I. Tr. In.		16	6		I. Tr. In.		5	48		III. Sh. Eg.
	3	15		I. Sh. Eg.		18	6		I. Sh. Eg.		6	41		I. Tr. In.
	3	41		I. Tr. Eg.		18	17		I. Tr. Eg.		6	45		I. Sh. In.
	12	23		II. * Sh. In.	14	4	15		II. Sh. In.		8	53		I. * Tr. Eg.
	13	16		II. * Tr. In.		4	38		II. Tr. In.		8	57		I. * Sh. Eg.
	14	53		II. * Sh. Eg.		6	45		II. Sh. Eg.		19	58		II. Tr. In.
	15	41		II. * Tr. Eg.		7	4		II. Tr. Eg.		20	6		II. Sh. In.
	22	25	48.6	I. Ec. Dis.		13	16	35.6	I. * Ec. Dis.		22	25		II. Tr. Eg.
4	1	0		I. Oc. Re.		15	36		I. * Oc. Re.		22	37		II. Sh. Eg.
	19	31		I. Sh. In.	15	10	22		I. * Sh. In.	25	4	0		I. Oc. Dis.
	19	56		I. Tr. In.		10	32		I. * Tr. In.		6	15	31.8	I. Ec. Re.
	21	44		I. Sh. Eg.		12	35		I. * Sh. Eg.	26	1	7		I. Tr. In.
	22	7		I. Tr. Eg.		12	43		I. * Tr. Eg.		1	13		I. Sh. In.
5	6	35	19.4	II. Ec. Dis.		22	27	52.0	II. Ec. Dis.		3	19		I. Tr. Eg.
	9	46		II. * Oc. Re.	16	1	9		II. Oc. Re.		3	26		I. Sh. Eg.
	16	54	13.2	I. Ec. Dis.		7	45	3.3	I. Ec. Dis.		14	5		II. * Oc. Dis.
	19	26		I. Oc. Re.		10	2		I. * Oc. Re.		16	46	19.0	II. Ec. Re.
6	6	18	20.0	III. Ec. Dis.		23	55		III. Sh. In.		22	26		I. Oc. Dis.
	9	19		III. * Oc. Re.	17	0	33		III. Tr. In.	27	0	44	1.4	I. Ec. Re.
	13	59		I. * Sh. In.		1	49		III. Sh. Eg.		17	39		III. Oc. Dis.
	14	22		I. * Tr. In.		2	3		III. Tr. Eg.		19	33		I. Tr. In.
	16	12		I. * Sh. Eg.		4	50		I. Sh. In.		19	42		I. Sh. In.
	16	33		I. Tr. Eg.		4	58		I. Tr. In.		19	53	22.0	III. Ec. Re.
7	1	40		II. Sh. In.		7	3		I. Sh. Eg.		21	45		I. Tr. Eg.
	2	24		II. Tr. In.		7	9		I. Tr. Eg.		21	54		I. Sh. Eg.
	4	10		II. Sh. Eg.		17	32		II. Sh. In.	28	9	5		II. * Tr. In.
	4	49		II. Tr. Eg.		17	45		II. Tr. In.		9	24		II. * Sh. In.
	11	22	41.9	I. * Ec. Dis.		20	2		II. Sh. Eg.		11	32		II. * Tr. Eg.
	13	52		I. * Oc. Re.		20	11		II. Tr. Eg.		11	55		II. * Sh. Eg.
8	8	28		I. Sh. In.	18	2	13	35.8	I. Ec. Dis.		16	52		I. Oc. Dis.
	8	48		I. Tr. In.		4	28		I. Oc. Re.		19	12	34.0	I. Ec. Re.
	10	41		I. * Sh. Eg.		23	19		I. Sh. In.	29	13	59		I. * Tr. In.
	10	59		I. * Tr. Eg.		23	23		I. Tr. In.		14	11		I. * Sh. In.
	19	52	36.9	II. Ec. Dis.	19	1	32		I. Sh. Eg.		16	11		I. Tr. Eg.
	22	54		II. Oc. Re.		1	35		I. Tr. Eg.		16	23		I. Sh. Eg.
9	5	51	8.0	I. Ec. Dis.		11	45	53.7	II. * Ec. Dis.	30	3	12		II. Oc. Dis.
	8	18		I. Oc. Re.		14	17		II. * Oc. Re.		6	3	58.7	II. Ec. Re.
	19	57		III. Sh. In.		20	42	3.6	I. Ec. Dis.		11	18		I. * Oc. Dis.
	21	17		III. Tr. In.		22	54		I. Oc. Re.		13	41	4.5	I. * Ec. Re.
	21	50		III. Sh. Eg.	20	14	14	1.8	III. * Ec. Dis.	31	7	4		III. Tr. In.
	22	45		III. Tr. Eg.		15	55		III. Oc. Re.		7	51		III. Sh. In.
10	2	56		I. Sh. In.		17	47		I. Sh. In.		8	25		I. * Tr. In.
	3	14		I. Tr. In.		17	49		I. Tr. In.		8	39		I. * Sh. In.
	5	9		I. Sh. Eg.		20	0		I. Sh. Eg.		8	39		III. * Tr. Eg.
	5	25		I. Tr. Eg.		20	1		I. Tr. Eg.		9	46		III. * Sh. Eg.
	14	57		II. * Sh. In.	21	6	49		II. Sh. In.		10	37		I. * Tr. Eg.
	15	31		II. * Tr. In.		6	52		II. Tr. In.		10	51		I. * Sh. Eg.
	17	27		II. Sh. Eg.		9	18		II. * Tr. Eg.		22	12		II. Tr. In.
	17	57		II. Tr. Eg.		9	20		II. * Sh. Eg.		22	41		II. Sh. In.

Norm.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

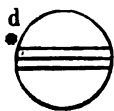
Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

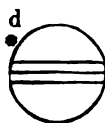
MAY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.



II.



III.

*Configurations at 12<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1	4.		1.	○	3.			
2	4.			○	3.	1.	2.	
3	4.		3.	1.	2.	○		
4		4.	3.	2.	○	1.		
5			3.	1.	2.	○		
6				4.	1.	2.		
7			2.	○		4.	3.	1. ●
8			2.	1.	○	3.	4.	
9				○	1.	2.	4.	
10			3.	1.	○	2.	4.	
11		3.	2.	○	1.		4.	
12		3.	1.	○			4.	2. ●
13				○	1.	2.	4.	3. ●
14			2.	1.	○	4.	3.	
15	○ 1.		4.	○		3.		
16		4.		○	1.	2.		
17		4.		○	1.	2.		
18	4.		3.	2.	○	1.		
19	4.		3.	1.	○			2. ●
20		4.		○	3.	1.	2.	
21		4.		○		3.		
22			2.	4.	○		3.	
23				○	1.	4.	2.	3.
24			3.	1.	○	2.	4.	
25		3.	2.	○	1.		4.	
26		3.	1.	2.	○		4.	
27			3.	○	1.	2.	4.	
28			1.	2.	○	3.	4.	
29			2.	○	1.		3.	4.
30				○	2.	4.		1. ●
31			1.	2.	○			

## WASHINGTON MEAN TIME.

## JUNE.

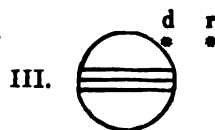
d	h	m	s		d	h	m	s		d	h	m	s	
1	0	39		II. Tr. Eg.	11	3	52	18.0	III. Ec. Re.	21	15	54		I. Tr. Eg.
	1	12		II. Sh. Eg.		13	34		II. * Tr. In.		16	35		I. Sh. Eg.
	5	44		I. Oc. Dis.		14	34		II. * Sh. In.		17	1		III. Tr. In.
	8	9	39.6	I. * Ec. Re.		16	2		II. Tr. Eg.		18	47		III. Tr. Eg.
2	2	51		I. Tr. In.		17	4		II. Sh. Eg.		19	47		III. Sh. In.
	3	8		I. Sh. In.		20	21		I. Oc. Dis.		21	45		III. Sh. Eg.
	5	3		I. Tr. Eg.		23	1	0.5	I. Ec. Re.	22	4	58		II. Tr. In.
	5	20		I. Sh. Eg.	12	17	29		I. Tr. In.		6	25		II. Sh. In.
	16	20		II. Oc. Dis.		18	0		I. Sh. In.		7	27		II. Tr. Eg.
	19	22	24.6	II. Ec. Re.		19	41		I. Tr. Eg.		8	55		II. * Sh. Eg.
3	0	10		I. Oc. Dis.		20	12		I. Sh. Eg.		10	59		I. * Oc. Dis.
	2	38	10.7	I. Ec. Re.	13	7	45		II. Oc. Dis.		13	52	35.8	I. * Ec. Re.
	20	56		III. Oc. Dis.		11	16	36.8	II. * Ec. Re.	23	8	9		I. * Tr. In.
	21	17		I. Tr. In.		14	47		I. Oc. Dis.		8	52		I. * Sh. In.
	21	37		I. Sh. In.		17	29	33.9	I. Ec. Re.		10	21		I. * Tr. Eg.
	23	29		I. Tr. Eg.	14	11	56		I. * Tr. In.		11	4		I. * Sh. Eg.
	23	49		I. Sh. Eg.		12	29		I. * Sh. In.		23	13		II. Oc. Dis.
	23	53	4.7	III. Ec. Re.		13	40		III. * Tr. In.	24	3	12	11.8	II. Ec. Re.
4	11	19		II. * Tr. In.		14	8		I. * Tr. Eg.		5	26		I. Oc. Dis.
	11	59		II. * Sh. In.		14	41		I. Sh. Eg.		8	21	11.6	I. * Ec. Re.
	13	47		II. * Tr. Eg.		15	21		III. Tr. Eg.	25	2	35		I. Tr. In.
	14	29		II. * Sh. Eg.		15	48		III. Sh. In.		3	21		I. Sh. In.
	18	36		I. Oc. Dis.		17	45		III. Sh. Eg.		4	47		I. Tr. Eg.
	21	6	44.3	I. Ec. Re.	15	2	42		II. Tr. In.		5	33		I. Sh. Eg.
5	15	43		I. Tr. In.		3	51		II. Sh. In.		6	56		III. Oc. Dis.
	16	5		I. Sh. In.		5	10		II. Tr. Eg.		8	43		III. * Oc. Re.
	17	55		I. Tr. Eg.		6	21		II. Sh. Eg.		10	5	56.1	III. * Ec. Dis.
	18	17		I. Sh. Eg.		9	13		I. * Oc. Dis.		11	50	45.3	III. * Ec. Re.
6	5	28		II. Oc. Dis.		11	58	11.7	I. * Ec. Re.		18	8		II. Tr. In.
	8	40	10.1	II. * Ec. Re.	16	6	22		I. Tr. In.		19	43		II. Sh. In.
	13	2		I. * Oc. Dis.		6	57		I. Sh. In.		20	36		II. Tr. Eg.
	15	35	16.2	I. Ec. Re.		8	34		I. * Tr. Eg.		22	13		II. Sh. Eg.
7	10	9		I. * Tr. In.		9	9		I. * Sh. Eg.		23	52		I. Oc. Dis.
	10	21		III. * Tr. In.		20	54		II. Oc. Dis.	26	2	49	49.0	I. Ec. Re.
	10	34		I. * Sh. In.	17	0	35	21.6	II. Ec. Re.		21	2		I. Tr. In.
	11	50		III. * Sh. In.		3	40		I. Oc. Dis.		21	49		I. Sh. In.
	11	59		III. * Tr. Eg.		6	26	46.3	I. Ec. Re.		23	14		I. Tr. Eg.
	12	21		I. * Tr. Eg.	18	0	49		I. Tr. In.	27	0	2		I. Sh. Eg.
	12	46		I. * Sh. Eg.		1	26		I. Sh. In.		12	23		II. * Oc. Dis.
	13	46		III. * Sh. Eg.		3	1		I. Tr. Eg.		16	30	13.5	II. Ec. Re.
8	0	26		II. Tr. In.		3	33		III. Oc. Dis.		18	19		I. Oc. Dis.
	1	16		II. Sh. In.		3	38		I. Sh. Eg.		21	18	24.7	I. Ec. Re.
	2	54		II. Tr. Eg.		5	16		III. Oc. Re.	28	15	29		I. Tr. In.
	3	46		II. Sh. Eg.		6	7	45.7	III. Ec. Dis.		16	18		I. Sh. In.
	7	28		I. Oc. Dis.		7	51	38.1	III. Ec. Re.		17	41		I. Tr. Eg.
	10	3	52.8	I. * Ec. Re.		15	50		II. Tr. In.		18	31		I. Sh. Eg.
9	4	36		I. Tr. In.		17	8		II. Sh. In.		20	27		III. Tr. In.
	5	3		I. Sh. In.		18	18		II. Tr. Eg.		22	16		III. Tr. Eg.
	6	48		I. Tr. Eg.		19	38		II. Sh. Eg.		23	47		III. Sh. In.
	7	15		I. Sh. Eg.		22	6		I. Oc. Dis.	29	1	45		III. Sh. Eg.
	18	36		II. Oc. Dis.	19	0	55	22.2	I. Ec. Re.		7	18		II. Tr. In.
	21	58	45.6	II. Ec. Re.		19	15		I. Tr. In.		9	0		II. * Sh. In.
10	1	55		I. Oc. Dis.		19	55		I. Sh. In.		9	46		II. * Tr. Eg.
	4	32	25.6	I. Ec. Re.		21	27		I. Tr. Eg.		11	30		II. * Sh. Eg.
	23	3		I. Tr. In.		22	7		I. Sh. Eg.		12	46		I. * Oc. Dis.
	23	31		I. Sh. In.	20	10	3		II. * Oc. Dis.		15	47	4.5	I. Ec. Re.
11	0	14		III. Oc. Dis.		13	53	18.4	II. * Ec. Re.	30	9	55		I. * Tr. In.
	1	15		I. Tr. Eg.		16	32		I. Oc. Dis.		10	47		I. * Sh. In.
	1	43		I. Sh. Eg.		19	23	57.0	I. Ec. Re.		12	7		I. * Tr. Eg.
	1	53		III. Oc. Re.	21	13	42		I. * Tr. In.		13	0		I. * Sh. Eg.
2	9	21.2		III. Ec. Dis.		14	23		I. Sh. In.					

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

JUNE.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 11<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1		3 <sup>•</sup>	4 <sup>•</sup>	2 <sup>•</sup>	○	1 <sup>•</sup>		
2		4 <sup>•</sup>	3 <sup>•</sup>	1 <sup>•</sup> 2 <sup>•</sup>	○			
3		4 <sup>•</sup>		3 <sup>•</sup>	○	1 <sup>•</sup> 2 <sup>•</sup>		
4		4 <sup>•</sup>		1 <sup>•</sup>	2 <sup>•</sup> ○	3 <sup>•</sup>		
5		4 <sup>•</sup>		2 <sup>•</sup>	○	1 <sup>•</sup>	3 <sup>•</sup>	
6		4 <sup>•</sup>		1 <sup>•</sup>	○	2 <sup>•</sup>	3 <sup>•</sup>	
7	○ 1 <sup>•</sup> ○ 3 <sup>•</sup>		4 <sup>•</sup>		○	2 <sup>•</sup>		
8			3 <sup>•</sup>	2 <sup>•</sup> 4 <sup>•</sup>	○	1 <sup>•</sup>		
9			3 <sup>•</sup>	1 <sup>•</sup>	○	4 <sup>•</sup>		
10				3 <sup>•</sup>	○	1 <sup>•</sup> 2 <sup>•</sup>	4 <sup>•</sup>	
11				1 <sup>•</sup>	○ 2 <sup>•</sup>	3 <sup>•</sup>	4 <sup>•</sup>	
12			2 <sup>•</sup>		○	1 <sup>•</sup>	3 <sup>•</sup> 4 <sup>•</sup>	
13				1 <sup>•</sup>	○	3 <sup>•</sup>	4 <sup>•</sup> 2 <sup>•</sup> ●	
14					○ 1 <sup>•</sup> 3 <sup>•</sup>	2 <sup>•</sup>	4 <sup>•</sup>	
15			3 <sup>•</sup> 2 <sup>•</sup>		○	4 <sup>•</sup>	1 <sup>•</sup> ●	
16		3 <sup>•</sup>	2 <sup>•</sup> 1 <sup>•</sup>		○	4 <sup>•</sup>		
17			3 <sup>•</sup> 4 <sup>•</sup>		○	1 <sup>•</sup> 2 <sup>•</sup>		
18		4 <sup>•</sup>	1 <sup>•</sup>		○	3 <sup>•</sup>		
19		4 <sup>•</sup>	2 <sup>•</sup>		○	1 <sup>•</sup> 3 <sup>•</sup>		
20		4 <sup>•</sup>		1 <sup>•</sup>	○	3 <sup>•</sup>	2 <sup>•</sup> ●	
21		4 <sup>•</sup>			○ 1 <sup>•</sup> 3 <sup>•</sup>	2 <sup>•</sup>		
22		4 <sup>•</sup>	3 <sup>•</sup> 2 <sup>•</sup>		○		1 <sup>•</sup> ●	
23		4 <sup>•</sup> 3 <sup>•</sup>	2 <sup>•</sup> 1 <sup>•</sup>		○			
24			3 <sup>•</sup> 4 <sup>•</sup>		○	1 <sup>•</sup> 2 <sup>•</sup>		
25			1 <sup>•</sup>		○ 4 <sup>•</sup>	2 <sup>•</sup>	3 <sup>•</sup> ●	
26			2 <sup>•</sup>		○	1 <sup>•</sup> 4 <sup>•</sup> 3 <sup>•</sup>		
27				1 <sup>•</sup>	○ 2 <sup>•</sup>	3 <sup>•</sup> 4 <sup>•</sup>		
28					○	1 <sup>•</sup> 3 <sup>•</sup> 2 <sup>•</sup>	4 <sup>•</sup>	
29			3 <sup>•</sup>	1 <sup>•</sup> 3 <sup>•</sup>	○		4 <sup>•</sup>	
30	○ 1 <sup>•</sup>	3 <sup>•</sup>	2 <sup>•</sup>		○		4 <sup>•</sup>	



## WASHINGTON MEAN TIME.

## JULY.

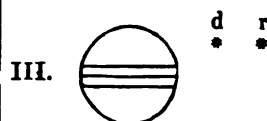
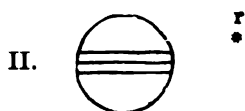
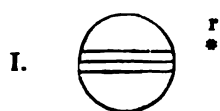
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	1	34			11	3	52			21	17	36			1	17	36		
	5	49	14.8			17	9				18	45			I.	Sh.	Eg.		
	7	12				21	44	39.3		II.	Ec.	Re.			II.	* Oc.	Dis.		
	10	15	41.7			21	55			I.	Oc.	Dis.			I.	Oc.	Dis.		
2	4	22			12	1	7	32.7		I.	Ec.	Re.			13	41	25.6		
	5	15				19	5			I.	Tr.	In.			15	59	34.7		
	6	34				20	7			I.	Sh.	In.			9	51			
	7	28				21	17			I.	Tr.	Eg.			11	0			
	10	22				22	20			I.	Sh.	Eg.			12	4			
	12	13			13	3	31			III.	Tr.	In.			13	13			
	14	4	13.5			5	26			III.	Tr.	Eg.			21	10			
	15	50	0.7			7	45			III.	Sh.	In.			23	10			
	20	27				9	45			III.	* Sh.	Eg.			24	2	1	11.1	
	22	17				11	58			II.	* Tr.	In.				3	36		
	22	56				14	9			II.	Sh.	In.				3	49	57.5	
3	0	48				14	29			II.	Tr.	Eg.				6	1		
	1	39				16	22			I.	Oc.	Dis.				6	7		
	4	44	19.8			16	40			II.	Sh.	Eg.				7	7		
	22	49				19	36	14.2		I.	Ec.	Re.				8	32		
	23	44			14	13	33			I.	Tr.	In.				10	28	14.8	
4	1	1				14	36			I.	Sh.	In.			25	4	19		
	1	57				15	45			I.	Tr.	Eg.				5	29		
	14	45				16	49			I.	Sh.	Eg.				6	32		
	19	7	20.9			15	6	22		II.	Oc.	Dis.				7	42		
	20	6				10	49			I.	* Oc.	Dis.				22	5		
	23	12	56.9			11	3	53.4		II.	* Ec.	Re.			26	1	35		
5	17	16				14	4	53.6		I.	Ec.	Re.				2	59	41.7	
	18	13				8	0			I.	* Tr.	In.				4	56	54.7	
	19	28				9	5			I.	* Sh.	In.				22	47		
	20	26				10	13			I.	* Tr.	Eg.				23	58		
	23	57				11	18			I.	* Sh.	Eg.			27	1	0		
6	1	49				17	29			III.	Oc.	Dis.				2	11		
	3	46				19	26			III.	Oc.	Re.				10	51		
	5	45				22	1	47.5		III.	Ec.	Dis.				12	53		
	9	36				23	49	32.9		III.	Ec.	Re.				15	43		
	11	34			17	1	10			II.	Tr.	In.				16	49		
	12	7				3	26			II.	Sh.	In.				17	45		
	14	5				3	41			II.	Tr.	Eg.				19	18		
	14	33				5	17			I.	Oc.	Dis.				19	21		
	17	41	37.5			5	57			II.	Sh.	Eg.				20	3		
7	11	43				8	33	33.2		I.	* Ec.	Re.				21	49		
	12	41				2	28			I.	Tr.	In.				23	25	37.0	
	13	55				3	34			I.	Sh.	In.			28	17	15		
	14	54				4	40			I.	Tr.	Eg.				18	27		
8	3	57				5	47			I.	Sh.	Eg.				19	28		
	8	26	29.2			19	36			II.	Oc.	Dis.				20	40		
	9	0				23	44			I.	Oc.	Dis.			29	11	20		
	12	10	15.7			0	22	6.5		II.	Ec.	Re.				14	30		
9	6	10				3	2	12.5		I.	Ec.	Re.				16	19	4.9	
	7	10				20	55			I.	Tr.	In.				17	54	18.4	
	8	22				22	3			I.	Sh.	In.			30	11	43		
	9	23				23	8			I.	Tr.	Eg.				12	56		
	13	54			20	0	16			I.	Sh.	Eg.				13	56		
	15	47				7	9			III.	Tr.	In.				15	9		
	18	3	1.1			9	7			III.	* Tr.	Eg.			31	0	55		
	19	49	46.7			11	44			III.	* Sh.	In.				2	57		
	22	46				13	45			III.	Sh.	Eg.				6	0	0.0	
10	0	52				14	23			II.	Tr.	In.				6	3		
	1	18				16	43			II.	Sh.	In.				7	49	48.3	
	3	23				16	54			II.	Tr.	Eg.				8	36		
	3	27				18	12			I.	Oc.	Dis.				8	36		
	6	38	54.6			19	14			II.	Sh.	Eg.				8	58		
11	0	38				21	30	54.3		I.	Ec.	Re.				11	7		
	1	39				21	5			I.	Tr.	In.				12	22	59.0	
	2	50				16	32			I.	Sh.	In.							

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

JULY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 10<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1			·3	○	·2	4·	·1 ●	
2			1·	○3	2·	4·		
3			2·	○	4·	·1	·3	
4			4·	1·	·2	○	3·	
5			4·		○	1·	3·	·2
6	○ 2·	4·		·1	○			
7		4·	3·	·2	○	1·		
8		·4	·3		○	·2	·1 ●	
9		·4		·1	○	2·		
10		·4	2·		○	·1	·3	
11			·1	·2	○		3·	
12					○	·1	·2	·3
13			·1	·3	○	·2	·4	
14		3·	2·		○	1·	·4	
15		·3		·1	○		·4	·2 ●
16	○ 1·		·3		○	2·	4·	
17			2·		○	·1	·3	4·
18			·1		○		·3	4·
19					○	·1	·2	·3
20			·1	·2	○	·3		
21			·2	·3	○	1·		
22		4·	·3	·1	○		·2 ●	
23	○ 1·	4·		·3	○	2·		
24		4·		2·	○	·3	·1 ●	
25		·4		·2	1·		·3	
26		·4			○	·1	·2	·3
27		·4	1·	3·	○	·2		
28			·2	·3	○	1·		
29		·3		·1	○	2·	·4	
30			·3		○	1·	2·	·4
31				·2	○	·3	·4	·1 ●

## WASHINGTON MEAN TIME.

## AUGUST.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	6	11			11	1	46			21	16	13			21	16	13		
	7	25		I. Tr. In.		2	59		III. Sh. Eg.		16	20				16	20		II. Sh. In.
	8	24		I. * Tr. Eg.		3	15	7.9	I. Ec. Re.		17	55	55.1		III. Ec. Dis.	17	55	55.1	I. Ec. Re.
	9	38		I. * Sh. Eg.		21	1		I. Tr. In.		18	7	19.0		I. Ec. Re.	18	7	19.0	II. Sh. Eg.
2	0	36		II. Oc. Dis.		22	18		I. Sh. In.		18	51				18	51		III. Ec. Re.
	3	26		I. Oc. Dis.		23	15		I. Tr. Eg.		19	48	55.1		III. Ec. Re.	19	48	55.1	I. Tr. In.
	5	37	23.3	II. Ec. Re.	12	0	32		I. Sh. Eg.	22	11	54			I. Tr. In.	11	54		I. Sh. In.
	6	51	39.5	I. Ec. Re.		16	28		II. Oc. Dis.		13	11			I. Tr. Eg.	13	11		I. Sh. Eg.
3	0	39		I. Tr. In.		18	16		I. Oc. Dis.		14	8			I. Sh. Eg.	14	8		II. * Oc. Dis.
	1	53		I. Sh. In.		21	34	36.4	II. Ec. Re.		15	25			I. * Oc. Dis.	15	25		I. Ec. Re.
	2	52		I. Tr. Eg.		21	43	50.4	I. Ec. Re.	23	8	23			I. * Oc. Dis.	8	23		I. Ec. Re.
	4	7		I. Sh. Eg.	13	15	29		I. Tr. In.		9	8			I. * Oc. Dis.	9	8		I. Ec. Re.
	14	39		III. Tr. In.		16	46		I. Sh. In.		12	36	1.0		II. Ec. Re.	12	36	1.0	II. Tr. In.
	16	42		III. Tr. Eg.		17	43		I. Tr. Eg.		13	30	47.0		II. Ec. Re.	13	30	47.0	I. Tr. In.
	19	18		II. Tr. In.		19	0		I. Sh. Eg.	24	6	23			I. Tr. In.	6	23		I. * Sh. In.
	19	43		III. Sh. In.	14	8	37		III. * Oc. Dis.		7	40			I. * Tr. Eg.	7	40		I. Sh. Eg.
	21	45		III. Sh. Eg.		10	44		III. Oc. Re.		8	37			I. Sh. In.	8	37		III. Tr. In.
	21	51		II. Tr. Eg.		11	6		II. Tr. In.		9	53			I. Ec. Re.	9	53		II. Tr. In.
	21	53		II. Sh. In.		12	45		I. Oc. Dis.	25	2	28			I. Ec. Re.	2	28		I. Sh. In.
	21	54		I. Oc. Dis.		13	39		II. Tr. Eg.		2	58			I. Ec. Re.	2	58		III. * Sh. In.
4	0	24		II. Sh. Eg.		13	45		II. Sh. Eg.		3	37			III. * Sh. In.	3	37		II. * Sh. Eg.
	1	20	21.9	I. Ec. Re.		13	57	20.0	III. Ec. Dis.		4	38			II. * Sh. Eg.	4	38		III. Sh. Eg.
	19	7		I. Tr. In.		15	49	15.0	III. Ec. Re.	26	5	31			I. Tr. In.	5	31		I. Sh. In.
	20	22		I. Sh. In.		16	12	31.3	I. Ec. Re.		5	37			I. Sh. In.	5	37		I. Ec. Re.
	21	21		I. Tr. Eg.		16	16		II. Sh. Eg.		7	4	42.5		I. Ec. Re.	7	4	42.5	III. * Sh. In.
	22	36		I. Sh. Eg.	15	9	58		I. * Tr. In.		7	41			III. * Sh. In.	7	41		II. * Sh. Eg.
5	13	53		II. Oc. Dis.		11	15		I. Sh. In.		8	8			II. * Sh. Eg.	8	8		III. Sh. Eg.
	16	23		I. Oc. Dis.		12	12		I. Tr. Eg.		9	47			III. Sh. Eg.	9	47		I. Tr. In.
	18	56	49.2	II. Ec. Re.		13	29		I. Sh. Eg.	26	0	52			I. Tr. In.	0	52		I. Sh. In.
	19	49	3.6	I. Ec. Re.	16	5	46		II. Oc. Dis.		2	9			I. Sh. In.	2	9		I. Tr. Eg.
6	13	36		I. Tr. In.		7	13		I. Oc. Dis.		3	6			I. Tr. Eg.	3	6		I. Sh. In.
	14	51		I. Sh. In.		10	41	12.7	I. Ec. Re.		4	22			I. Sh. In.	4	22		II. Oc. Dis.
	15	49		I. Tr. Eg.		10	52	57.3	II. Ec. Re.		21	43			II. Oc. Dis.	21	43		I. Oc. Dis.
	17	5		I. Sh. Eg.	17	4	27		I. Tr. In.		22	6			I. Ec. Re.	22	6		I. Ec. Re.
7	4	44		III. Oc. Dis.		5	44		I. Sh. In.	27	1	33	25.6		I. Ec. Re.	1	33	25.6	II. Ec. Re.
	6	49		III. Oc. Re.		6	41		I. Tr. Eg.		2	50	15.2		II. Ec. Re.	2	50	15.2	I. Tr. In.
	8	33		II. * Tr. In.		7	58		I. * Sh. Eg.		19	21			I. Tr. In.	19	21		I. Sh. In.
	9	58	48.3	III. * Ec. Dis.		22	28		III. Tr. In.		20	38			I. Sh. In.	20	38		I. Tr. Eg.
	10	51		I. Oc. Dis.	18	0	23		II. Tr. In.		21	35			I. Tr. Eg.	21	35		I. Sh. Eg.
	11	6		II. Tr. Eg.		0	36		III. Tr. Eg.		22	51			I. Sh. Eg.	22	51		II. Tr. In.
	11	11		II. Sh. In.		1	42		I. Oc. Dis.		16	17			II. Tr. In.	16	17		I. Oc. Dis.
	11	49	39.5	III. Ec. Re.		2	56		II. Tr. Eg.		16	35			I. Oc. Dis.	16	35		III. Oc. Re.
	13	42		II. Sh. Eg.		3	2		II. Sh. In.		16	37			III. Oc. Re.	16	37		II. Tr. Eg.
	14	17	44.7	I. Ec. Re.		3	42		III. Sh. In.		18	48			II. Tr. Eg.	18	48		II. Sh. In.
8	8	4		I. * Tr. In.		5	9	55.3	I. Ec. Re.		18	50			II. Sh. In.	18	50		I. Ec. Re.
	9	20		I. * Sh. In.		5	33		II. Sh. Eg.		18	54			I. Ec. Re.	18	54		II. Sh. In.
	10	18		I. * Tr. Eg.		5	47		III. Sh. Eg.		20	2	6.7		I. Ec. Re.	20	2	6.7	II. Sh. Eg.
	11	34		I. Sh. Eg.		22	56		I. Tr. In.		21	26			II. Sh. Eg.	21	26		III. Ec. Dis.
9	3	10		II. Oc. Dis.	19	0	13		I. Sh. In.		21	54	58.1		III. Ec. Dis.	21	54	58.1	III. Ec. Re.
	5	19		I. Oc. Dis.		1	10		I. Tr. Eg.		23	49	3.9			23	49	3.9	
	8	15	9.0	II. * Ec. Re.		2	27		I. Sh. Eg.	29	13	50			I. Tr. In.	13	50		I. Sh. In.
	8	46	25.5	I. * Ec. Re.		19	5		II. Oc. Dis.		15	7			I. Sh. In.	15	7		I. Tr. Eg.
10	2	32		I. Tr. In.		20	10		I. Oc. Dis.		16	4			I. Tr. Eg.	16	4		I. Sh. Eg.
	3	49		I. Sh. In.		23	38	37.7	I. Ec. Re.		17	20			I. Sh. Eg.	17	20		II. Oc. Dis.
	4	46		I. Tr. Eg.	20	0	12	26.1	II. Ec. Re.	30	11	3			II. Oc. Dis.	11	3		I. Oc. Dis.
	6	3		I. Sh. Eg.		17	25		I. Tr. In.		11	4			I. Ec. Re.	11	4		II. Ec. Re.
	18	31		III. Tr. In.		18	42		I. Sh. In.		16	30	48.1		I. * Tr. In.	16	30	48.1	I. Sh. In.
	20	37		III. Tr. Eg.		19	39		I. Tr. Eg.		16	8	35.8		I. Sh. In.	16	8	35.8	
	21	49		II. Tr. In.		20	56		I. Sh. Eg.	31	8	19				8	19		
	23	42		III. Sh. In.	21	12	35		III. Oc. Dis.		9	36				9	36		
	23	47		I. Oc. Dis.		13	40		II. Tr. In.		10	33			I. Tr. Eg.	10	33		
11	0	22		II. Tr. Eg.		14	39		I. Oc. Dis.		11	49			I. Sh. Eg.	11	49		
	0	28		II. Sh. In.		14	44		III. Oc. Re.										

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

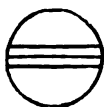
Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

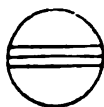
AUGUST.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

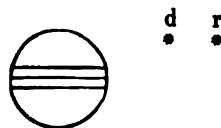
I.



II.



III.

*Configurations at 9h 0m for an Inverting Telescope.*

Day.	West.				East.			
1			2	1	3		4	
2					3		4	
3			1		3	2		4
4			3	2		1		4
5		3		1	2		4	
6			3	4		1	2	
7	2		4		1	3		
8	1		4	2		3		
9		4			1	2	3	
10		4		1		3	2	
11		4		3	2		1	
12			4	3		1		
13			3	4		1	2	
14				1	2			3
15			2		1		4	3
16						3	4	1
17				1		3	2	4
18				3	2		1	4
19		3		1				4
20			3			1	2	4
21				1	3		2	4
22			2			1	4	3
23				4		1		3
24			4			1	2	3
25		4			3		1	
26	4		3	2	1			
27	4			3			1	2
28		4		1	3		2	
29		4		2		1	3	
30			4		1		3	
31	1				4		3	2

## WASHINGTON MEAN TIME.

## SEPTEMBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	5	33			11	1	29			21	0	1	43.5						
	5	36		I. Oc. Dis.		2	42		I. Tr. Eg.		14	14		II. Ec. Re.					
	6	32		II. Tr. In.		20	28		I. Sh. Eg.		15	22		I. Tr. In.					
	8	9		III. Tr. In.		21	34		I. Oc. Dis.		16	27		I. Sh. In.					
	8	11		II. * Tr. Eg.		23	51	42.0	II. Tr. In.		17	35		I. Tr. Eg.					
				II. * Sh. In.					I. Ec. Re.					I. Sh. Eg.					
	8	44		III. * Tr. Eg.		12	0	4	II. Sh. In.		22	11	26	I. Oc. Dis.					
	8	59	30.4	I. * Ec. Re.			0	8	II. Tr. Eg.			13	37	II. Tr. In.					
	10	43		II. Sh. Eg.			0	52	III. Oc. Dis.			14	43	50.1	I. Ec. Re.				
	11	41		III. Sh. In.			2	35	II. Sh. Eg.			15	56	II. Sh. In.					
	13	47		III. Sh. Eg.			3	6	III. Oc. Re.			16	11	II. Tr. Eg.					
2	2	49		I. Tr. In.			5	53	21.4	III. Ec. Dis.		18	27	II. Sh. Eg.					
	4	5		I. Sh. In.			7	49	40.8	III. * Ec. Re.		19	4	III. Tr. In.					
	5	2		I. Tr. Eg.			17	46		I. Tr. In.		21	20	III. Tr. Eg.					
	6	18		I. Sh. Eg.			18	58		I. Sh. In.		23	38	III. Sh. In.					
3	0	2		I. Oc. Dis.			19	59		I. Tr. Eg.		23	1	48	III. Sh. Eg.				
	0	24		II. Oc. Dis.			21	11		I. Sh. Eg.			8	44	I. Tr. In.				
	3	28	13.4	I. Ec. Re.		13	14	58		I. Oc. Dis.			9	51	I. Sh. In.				
	5	28	2.6	II. Ec. Re.			16	28		II. Oc. Dis.			10	57	I. Tr. Eg.				
	21	18		I. Tr. In.			18	20	23.5	I. Ec. Re.			12	4	I. Sh. Eg.				
	22	33		I. Sh. In.			21	24	5.5	II. Ec. Re.		24	5	55	I. Oc. Dis.				
	23	31		I. Tr. Eg.		14	12	15		I. Tr. In.			8	36	II. Oc. Dis.				
4	0	46		I. Sh. Eg.			13	26		I. Sh. In.			9	12	33.1	I. Ec. Re.			
	18	31		I. Oc. Dis.			14	28		I. Tr. Eg.			13	21	0.2	II. Ec. Re.			
	18	55		II. Tr. In.			15	39		I. Sh. Eg.		25	3	13	I. Tr. In.				
	20	43		III. Oc. Dis.		15	9	27		I. Oc. Dis.			4	19	I. Sh. In.				
	21	28		II. Tr. Eg.			10	55		II. Tr. In.			5	27	I. Tr. Eg.				
	21	29		II. Sh. In.			12	49	4.5	I. Ec. Re.			6	32	I. Sh. Eg.				
	21	56	54.5	I. Ec. Re.			13	21		II. Sh. In.		26	0	25	I. Oc. Dis.				
	22	55		III. Oc. Re.			13	29		II. Tr. Eg.			2	58	II. Tr. In.				
5	0	1		II. Sh. Eg.			14	50		III. Tr. In.			3	41	12.9	I. Ec. Re.			
	1	53	53.4	III. Ec. Dis.			15	52		II. Sh. Eg.			5	14	II. Sh. In.				
	3	49	5.8	III. Ec. Re.			17	5		III. Tr. Eg.			5	33	II. Tr. Eg.				
	15	48		I. Tr. In.			19	39		III. Sh. In.			7	45	II. * Sh. Eg.				
	17	2		I. Sh. In.			21	48		III. Sh. Eg.			9	19	III. Oc. Dis.				
	18	1		I. Tr. Eg.		16	6	45		I. Tr. In.			11	35	III. Oc. Re.				
	19	15		I. Sh. Eg.			7	55		I. * Sh. In.			13	50	55.8	III. Ec. Dis.			
6	13	0		I. Oc. Dis.			8	58		I. Tr. Eg.			15	49	30.6	III. Ec. Re.			
	13	45		II. Oc. Dis.			10	8		I. Sh. Eg.			21	43	I. Tr. In.				
	16	25	36.1	I. Ec. Re.		17	3	57		I. Oc. Dis.			22	48	I. Sh. In.				
	18	46	22.9	II. Ec. Re.			5	51		II. Oc. Dis.			23	57	I. Tr. Eg.				
7	10	17		I. Tr. In.			7	17	47.7	I. * Ec. Re.		27	1	1	I. Sh. Eg.				
	11	31		I. Sh. In.			10	43	26.5	II. Ec. Re.			18	55	I. Oc. Dis.				
	12	30		I. Tr. Eg.			1	15		I. Tr. In.			21	58	II. Oc. Dis.				
	13	44		I. Sh. Eg.			2	24		I. Sh. In.			22	9	53.9	I. Ec. Re.			
8	7	30		I. * Oc. Dis.			3	28		I. Tr. Eg.		28	2	39	15.2	II. Ec. Re.			
	8	14		II. * Tr. In.			4	37		I. Sh. Eg.			16	13	I. Tr. In.				
	10	39		III. Tr. In.			22	26		I. Oc. Dis.			17	17	I. Sh. In.				
	10	46		II. Sh. In.		19	0	16		II. Tr. In.			18	27	I. Tr. Eg.				
	10	48		II. Tr. Eg.			1	46	28.1	I. Ec. Re.			19	30	I. Sh. Eg.				
	10	54	17.9	I. Ec. Re.			2	39		II. Sh. In.		29	13	24	I. Oc. Dis.				
	12	52		III. Tr. Eg.			2	50		II. Tr. Eg.			16	21	II. Tr. In.				
	13	18		II. Sh. Eg.			5	4		III. Oc. Dis.			16	38	34.4	I. Ec. Re.			
	15	40		III. Sh. In.			5	10		II. Sh. Eg.			18	31	II. Sh. In.				
	17	47		III. Sh. Eg.			7	19		III. * Oc. Re.			18	55	II. Tr. Eg.				
9	4	47		I. Tr. In.			9	52	10.8	III. Ec. Dis.			21	2	II. Sh. Eg.				
	6	0		I. Sh. In.			11	49	37.6	III. Ec. Re.			23	21	III. Tr. In.				
	7	0		I. Tr. Eg.			19	44		I. Tr. In.		30	1	38	III. Tr. Eg.				
	8	13		I. * Sh. Eg.			20	53		I. Sh. In.			3	37	III. Sh. In.				
10	1	59		I. Oc. Dis.			21	57		I. Tr. Eg.			5	49	III. Sh. Eg.				
	3	7		II. Oc. Dis.			23	6		I. Sh. Eg.			10	43	I. Tr. In.				
	5	23	1.1	I. Ec. Re.		20	16	56		I. Oc. Dis.			11	45	I. Sh. In.				
	8	5	47.0	II. * Ec. Re.			19	12		II. Oc. Dis.			12	57	I. Tr. Eg.				
	23	16		I. Tr. In.			20	15	9.3	I. Ec. Re.			13	59	I. Sh. Eg.				
11	0	29		I. Sh. In.															

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

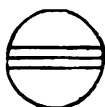
SEPTEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

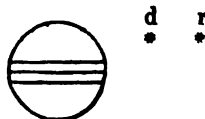
I.



II.



III.

*Configurations at 8<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	○ 3 <sup>•</sup> ○ 2 <sup>•</sup>	○ 4 <sup>•</sup> 1 <sup>•</sup> ●
2	3 <sup>•</sup> 2 <sup>•</sup> 1 <sup>•</sup> ○	4 <sup>•</sup>
3	3 <sup>•</sup> ○ 1 <sup>•</sup>	4 <sup>•</sup>
4	1 <sup>•</sup> ○ 2 <sup>•</sup>	4 <sup>•</sup>
5	2 <sup>•</sup> ○ 1 <sup>•</sup>	4 <sup>•</sup>
6	1 <sup>•</sup> ○	3 <sup>•</sup> 4 <sup>•</sup>
7	○ 1 <sup>•</sup>	3 <sup>•</sup> 4 <sup>•</sup>
8	3 <sup>•</sup> 4 <sup>•</sup> 1 <sup>•</sup> ○	1 <sup>•</sup> ●
9	3 <sup>•</sup> 4 <sup>•</sup> 1 <sup>•</sup> ○	
10	4 <sup>•</sup> 3 <sup>•</sup> 1 <sup>•</sup> ○	1 <sup>•</sup> 2 <sup>•</sup> ●
11	4 <sup>•</sup> 3 <sup>•</sup> 1 <sup>•</sup> ○	2 <sup>•</sup>
12	4 <sup>•</sup> 2 <sup>•</sup> ○ 3 <sup>•</sup> 1 <sup>•</sup>	
13	4 <sup>•</sup> 1 <sup>•</sup> ○	3 <sup>•</sup>
14	4 <sup>•</sup> ○ 1 <sup>•</sup> 2 <sup>•</sup> 3 <sup>•</sup>	
15	4 <sup>•</sup> 1 <sup>•</sup> ○ 3 <sup>•</sup>	
16	○ 1 <sup>•</sup> 3 <sup>•</sup> 4 <sup>•</sup> ○	
17	3 <sup>•</sup> ○ 1 <sup>•</sup> 4 <sup>•</sup>	2 <sup>•</sup> ●
18	3 <sup>•</sup> 1 <sup>•</sup> ○ 2 <sup>•</sup> 4 <sup>•</sup>	
19	2 <sup>•</sup> ○ 3 <sup>•</sup> 1 <sup>•</sup>	4 <sup>•</sup>
20	1 <sup>•</sup> ○ 3 <sup>•</sup>	4 <sup>•</sup>
21	○ 1 <sup>•</sup> 2 <sup>•</sup> 3 <sup>•</sup>	4 <sup>•</sup>
22	1 <sup>•</sup> ○ 2 <sup>•</sup> 3 <sup>•</sup>	4 <sup>•</sup>
23	2 <sup>•</sup> 3 <sup>•</sup> 1 <sup>•</sup> ○	4 <sup>•</sup>
24	3 <sup>•</sup> ○ 2 <sup>•</sup> 4 <sup>•</sup>	1 <sup>•</sup> ●
25	3 <sup>•</sup> 1 <sup>•</sup> 4 <sup>•</sup> 2 <sup>•</sup>	
26	4 <sup>•</sup> 2 <sup>•</sup> ○ 3 <sup>•</sup> 1 <sup>•</sup>	
27	4 <sup>•</sup> 1 <sup>•</sup> ○	3 <sup>•</sup>
28	4 <sup>•</sup> ○ 1 <sup>•</sup> 3 <sup>•</sup>	
29	4 <sup>•</sup> 1 <sup>•</sup> ○ 2 <sup>•</sup> 3 <sup>•</sup>	
30	4 <sup>•</sup> 2 <sup>•</sup> 3 <sup>•</sup> ○ 1 <sup>•</sup>	

## WASHINGTON MEAN TIME.

## OCTOBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	7	54			I. Oc. Dis.	11	3	57		I. Tr. Eg.	21	16	44		I. Tr. In.				
	11	7	17.0		I. Ec. Re.		4	52		I. Sh. Eg.		17	30		I. Sh. In.				
	11	22			II. Oc. Dis.		22	54		I. Oc. Dis.		17	50		III. Sh. Eg.				
	15	58	27.2		II. Ec. Re.	12	1	59	17.9	I. Ec. Re.		18	58		I. Tr. Eg.				
2	5	13			I. Tr. In.		3	34		II. Oc. Dis.		19	44		I. Sh. Eg.				
	6	14			I. Sh. In.		7	53	55.2	II. Ec. Re.	22	13	54		I. Oc. Dis.				
	7	27			I. * Tr. Eg.		20	13		I. Tr. In.		16	51	16.5	I. Ec. Re.				
	8	28			I. Sh. Eg.		21	7		I. Sh. In.		19	47		II. Oc. Dis.				
3	2	24			I. Oc. Dis.		22	27		I. Tr. Eg.		23	49	53.1	II. Ec. Re.				
	5	35	56.2		I. Ec. Re.		23	21		I. Sh. Eg.	23	11	14		I. Tr. In.				
	5	43			II. Tr. In.	13	17	24		I. Oc. Dis.		11	59		I. Sh. In.				
	7	49			II. Sh. In.		20	27	56.7	I. Ec. Re.		13	28		I. Tr. Eg.				
	8	17			II. Tr. Eg.		21	52		II. Tr. In.		14	13		I. Sh. Eg.				
	10	20			II. Sh. Eg.		23	41		II. Sh. In.	24	8	24		I. Oc. Dis.				
	13	36			III. Oc. Dis.	14	0	26		II. Tr. Eg.		11	19	54.2	I. Ec. Re.				
	15	53			III. Oc. Re.		2	12		II. Sh. Eg.		14	3		II. Tr. In.				
	17	49	21.9		III. Ec. Dis.		8	2		III. Tr. In.		15	34		II. Sh. In.				
	19	49	6.1		III. Ec. Re.		10	21		III. Tr. Eg.		16	37		II. Tr. Eg.				
	23	43			I. Tr. In.		11	36		III. Sh. In.		18	5		II. Sh. Eg.				
4	0	43			I. Sh. In.		13	50		III. Sh. Eg.	25	2	41		III. Oc. Dis.				
	1	57			I. Tr. Eg.		14	43		I. Tr. In.		5	2		III. Oc. Re.				
	2	57			I. Sh. Eg.		15	36		I. Sh. In.		5	45		I. Tr. In.				
	20	54			I. Oc. Dis.		16	58		I. Tr. Eg.		5	45	25.4	III. Ec. Dis.				
5	0	4	36.8		I. Ec. Re.		17	50		I. Sh. Eg.		6	28		I. Sh. In.				
	0	45			II. Oc. Dis.	15	11	54		I. Oc. Dis.		7	48	41.0	III. Ec. Re.				
	5	16	39.4		II. Ec. Re.		14	56	38.8	I. Ec. Re.		7	59		I. Tr. Eg.				
	18	13			I. Tr. In.		16	58		II. Oc. Dis.		8	42		I. Sh. Eg.				
	19	12			I. Sh. In.		21	12	54.9	II. Ec. Re.	26	2	54		I. Oc. Dis.				
	20	27			I. Tr. Eg.	16	9	13		I. Tr. In.		5	48	33.8	I. Ec. Re.				
	21	25			I. Sh. Eg.		10	4		I. Sh. In.		9	12		II. Oc. Dis.				
6	15	24			I. Oc. Dis.		11	28		I. Tr. Eg.		13	7	54.9	II. Ec. Re.				
	18	33	16.3		I. Ec. Re.		12	18		I. Sh. Eg.	27	0	15		I. Tr. In.				
	19	6			II. Tr. In.		6	24		I. * Oc. Dis.		0	56		I. Sh. In.				
	21	6			II. Sh. In.	17	9	25	17.0	I. Ec. Re.		2	29		I. Tr. Eg.				
	21	40			II. Tr. Eg.		11	15		II. Tr. In.		3	10		I. Sh. Eg.				
	23	37			II. Sh. Eg.		12	59		II. Sh. In.		21	24		I. Oc. Dis.				
7	3	41			III. Tr. In.		13	49		II. Tr. Eg.	28	0	17	10.7	I. Ec. Re.				
	5	58			III. Tr. Eg.		15	30		II. Sh. Eg.		3	27		II. Tr. In.				
	7	37			III. Sh. In.		22	18		III. Oc. Dis.		4	51		II. Sh. In.				
	9	50			III. Sh. Eg.	18	0	37		III. Oc. Re.		6	1		II. * Tr. Eg.				
	12	43			I. Tr. In.		1	46	42.8	III. Ec. Dis.		7	23		II. Sh. Eg.				
	13	40			I. Sh. In.		3	43		I. Tr. In.		16	48		III. Tr. In.				
	14	57			I. Tr. Eg.		3	48	47.4	III. Ec. Re.		18	45		I. Tr. In.				
	15	54			I. Sh. Eg.		4	33		I. Sh. In.		19	10		III. Tr. Eg.				
8	9	54			I. Oc. Dis.		5	58		I. Tr. Eg.		19	25		I. Sh. In.				
	13	1	59.0		I. Ec. Re.		6	47		I. Sh. Eg.		19	34		III. Sh. In.				
	14	10			II. Oc. Dis.	19	0	54		I. Oc. Dis.		20	59		I. Tr. Eg.				
	18	35	45.8		II. Ec. Re.		3	53	56.8	I. Ec. Re.		21	39		I. Sh. Eg.				
9	7	13			I. Tr. In.		6	22		II. * Oc. Dis.		21	49		III. Sh. Eg.				
	8	9			I. Sh. In.		10	31	0.6	II. Ec. Re.	29	15	55		I. Oc. Dis.				
	9	27			I. Tr. Eg.		22	14		I. Tr. In.		18	45	52.0	I. Ec. Re.				
	10	23			I. Sh. Eg.		23	2		I. Sh. In.		22	37		II. Oc. Dis.				
10	4	24			I. Oc. Dis.	20	0	28		I. Tr. Eg.		2	26	39.4	II. Ec. Re.				
	7	30	37.6		I. Ec. Re.		1	16		I. Sh. Eg.	30	13	16		I. Tr. In.				
	8	29			II. Tr. In.		19	24		I. Oc. Dis.		13	54		I. Sh. In.				
	10	24			II. Sh. In.		22	22	34.9	I. Ec. Re.		15	30		I. Tr. Eg.				
	11	3			II. Tr. Eg.	21	0	39		II. Tr. In.		16	8		I. Sh. Eg.				
	12	55			II. Sh. Eg.		2	16		II. Sh. In.		10	25		I. Oc. Dis.				
	17	56			III. Oc. Dis.		3	13		II. Tr. Eg.		13	14	28.9	I. Ec. Re.				
	20	14			III. Oc. Re.		4	47		II. Sh. Eg.		16	51		II. Tr. In.				
	21	47	49.4		III. Ec. Dis.		12	24		III. Tr. In.		18	9		II. Sh. In.				
	23	48	43.6		III. Ec. Re.		14	45		III. Tr. Eg.		19	25		II. Tr. Eg.				
11	1	43			I. Tr. In.		15	35		III. Sh. In.		20	41		II. Sh. Eg.				
	2	38			I. Sh. In.														

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

## WASHINGTON MEAN TIME.

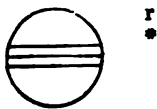
OCTOBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

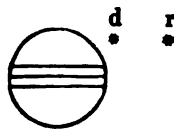
I.



II.



III.

*Configurations at 6h 30m for an Inverting Telescope.*

Day.	West.				East.			
1		4	3	2 1	○			
2	○ 1		4		○	2		
3	○ 2			4	○	1		
4			2	1	○	4	3	
5					○	2	1	4
6			1		○	2	3	4
7			2	3	○	1		4
8		3	2	1	○			4
9		3		1	○	2	4	
10			3		○	2	4	1 ●
11			2	1	○	3	4	
12				4	○	1	3	2 ●
13		4	1		○	2	3	
14		4		2	3	○	1	
15	4		3	2	1	○		
16	4		3		○	1	2	
17	4			3	○	2		1 ●
18		4	2	1	○	3		
19			4		○	1	3	2 ●
20				1	4	○	2	3
21				2	○	3	1	4
22			3	1	○		4	
23		3			○	1	2	4
24			3	1	○	2		4
25	○ 1		2		○		4	3 ●
26				3	○	1	3	4
27				1	○		3	4
28				2	○	1		4
29			3	1	4	○		
30		3	4		○	1		
31		4	3	1	○	2		



## WASHINGTON MEAN TIME.

## NOVEMBER.

d	h	m	s		d	h	m	s		d	h	m	s	
1	7	6			5	20	40	24.9		11	11	39		
	7	46		III. Oc. Dis.	6	1	27		I. Ec. Re.		12	33		II. Tr. Eg.
	8	22		I. Tr. In.		5	3	13.8	II. Oc. Dis.		22	48		II. Sh. Eg.
	9	28		I. Sh. In.		15	17		II. Ec. Re.		23	14		I. Tr. In.
	9	44	37.5	III. Oc. Re.		15	48		I. Tr. In.	12	1	2		I. Sh. In.
				III. Ec. Dis.					I. Sh. In.					I. Tr. Eg.
	10	0		I. Tr. Eg.		17	31		I. Tr. Eg.		1	28		I. Sh. Eg.
	10	36		I. Sh. Eg.		18	2		I. Sh. Eg.		1	41		III. Tr. In.
	11	49	4.3	III. Ec. Re.	7	12	26		I. Oc. Dis.		3	31		III. Sh. In.
2	4	55		I. Oc. Dis.		15	9	0.9	I. Ec. Re.		4	4		III. Tr. Eg.
	7	43	7.7	I. Ec. Re.		19	40		II. Tr. In.		5	49		III. Sh. Eg.
	12	2		II. Oc. Dis.		20	44		II. Sh. In.		19	57		I. Oc. Dis.
	15	44	37.5	II. Ec. Re.		22	14		II. Tr. Eg.		22	34	54.6	I. Ec. Re.
3	2	16		I. Tr. In.		23	16		II. Sh. Eg.	13	4	17		II. Oc. Dis.
	2	51		I. Sh. In.	8	9	47		I. Tr. In.		7	39	35.0	II. Ec. Re.
	4	30		I. Tr. Eg.		10	17		I. Sh. In.		17	18		I. Tr. In.
	5	5		I. Sh. Eg.		11	33		III. Oc. Dis.		17	43		I. Sh. In.
	23	25		I. Oc. Dis.		12	1		I. Tr. Eg.		19	32		I. Tr. Eg.
4	2	11	43.1	I. Ec. Re.		12	31		I. Sh. Eg.		19	57		I. Sh. Eg.
	6	16		II. Tr. In.		15	48	47.4	III. Ec. Re.	14	14	27		I. Oc. Dis.
	7	26		II. Sh. In.	9	6	56		I. Oc. Dis.		17	3	30.3	I. Ec. Re.
	8	50		II. Tr. Eg.		9	37	39.1	I. Ec. Re.		22	29		II. Tr. In.
	9	58		II. Sh. Eg.		14	52		II. Oc. Dis.		23	19		II. Sh. In.
	20	47		I. Tr. In.		18	21	7.4	II. Ec. Re.	15	1	4		II. Tr. Eg.
	21	14		III. Tr. In.	10	4	18		I. Tr. In.		1	51		II. Sh. Eg.
	21	20		I. Sh. In.		4	46		I. Sh. In.		11	49		I. Tr. In.
	23	1		I. Tr. Eg.		6	32		I. Tr. Eg.		12	12		I. Sh. In.
	23	32		III. Sh. In.		7	0		I. Sh. Eg.		14	3		I. Tr. Eg.
	23	34		I. Sh. Eg.	11	1	27		I. Oc. Dis.		14	26		I. Sh. Eg.
	23	36		III. Tr. Eg.		4	6	14.7	I. Ec. Re.		16	0		III. Oc. Dis.
5	1	49		III. Sh. Eg.		9	5		II. Tr. In.		19	48	23.4	III. Ec. Re.
	17	56		I. Oc. Dis.		10	1		II. Sh. In.					

The Satellites are not visible from November 16 to the end of December, Jupiter being too near the Sun.

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.

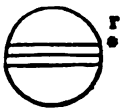
Oc., denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; \* Visible at Washington.

WASHINGTON MEAN TIME.

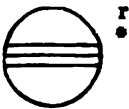
NOVEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

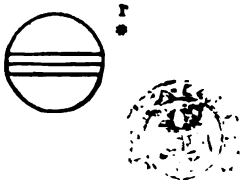
I.



II.

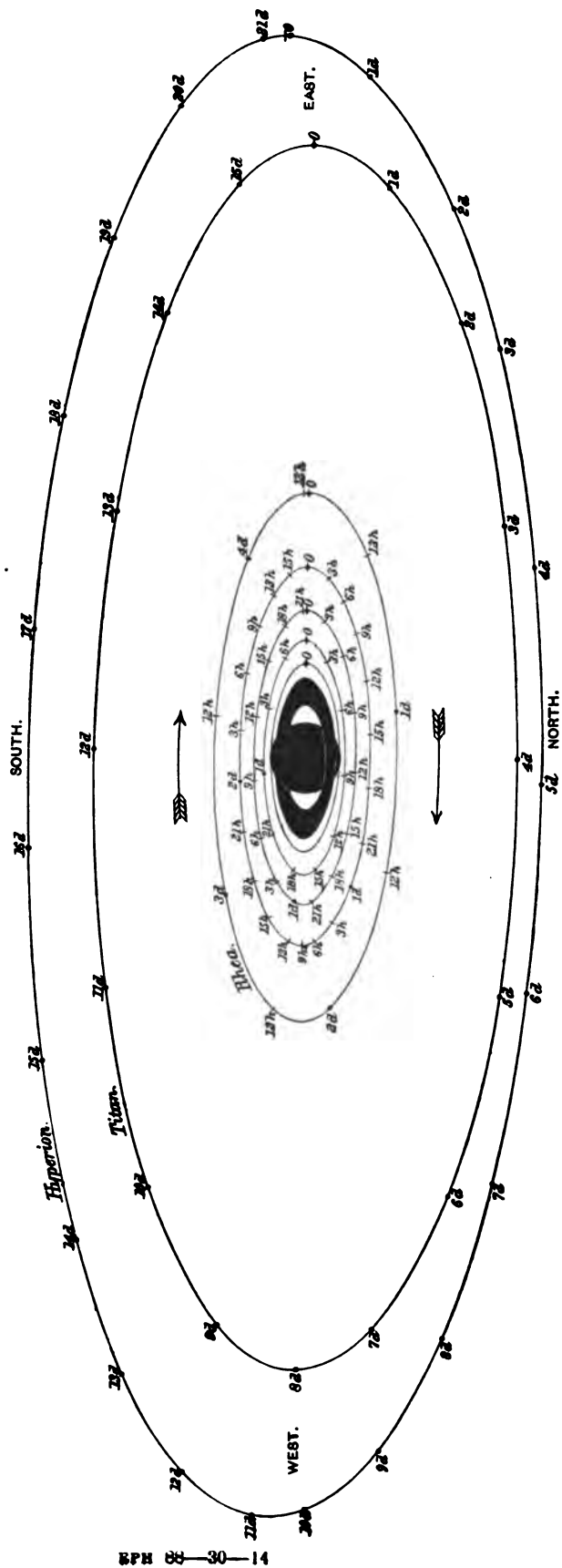


III.



*Configurations at 5<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.			East.		
1	4 <sup>•</sup>	3 <sup>•</sup>	• 31 <sup>•</sup>			
2	4 <sup>•</sup>	2 <sup>•</sup>	○	3 <sup>•</sup>		1 <sup>•</sup> ●
3	4 <sup>•</sup>	1 <sup>•</sup>	○	2 <sup>•</sup>	3 <sup>•</sup>	
4	4 <sup>•</sup>	2 <sup>•</sup>	○	1 <sup>•</sup>	3 <sup>•</sup>	
5		1 <sup>•</sup>	○			
6	3 <sup>•</sup>	4 <sup>•</sup>	○	2 <sup>•</sup>	1 <sup>•</sup>	
7	3 <sup>•</sup>	1 <sup>•</sup>	○	4 <sup>•</sup>		
8		2 <sup>•</sup>	○	1 <sup>•</sup>	4 <sup>•</sup>	
9		2 <sup>•</sup>	○	1 <sup>•</sup>	3 <sup>•</sup>	4 <sup>•</sup>
10	○ 1 <sup>•</sup>		○	2 <sup>•</sup>	3 <sup>•</sup>	4 <sup>•</sup>
11			○	1 <sup>•</sup>	3 <sup>•</sup>	4 <sup>•</sup>
12		2 <sup>•</sup>	1 <sup>•</sup> 3 <sup>•</sup> ○		4 <sup>•</sup>	
13	3 <sup>•</sup>		○	1 <sup>•</sup>	4 <sup>•</sup>	2 <sup>•</sup> ●
14	3 <sup>•</sup>	1 <sup>•</sup>	○	4 <sup>•</sup>	2 <sup>•</sup>	
15		2 <sup>•</sup>	○	1 <sup>•</sup>		



# **NAMES OF THE SATELLITES.**

- I. Mimas.
- II. Enceladus.
- III. Tethys.
- IV. Dione.
- V. Rhea.
- VI. Titan.
- VII. Hyperion.
- VIII. Iapetus.

**APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN,**  
**AT OPPOSITION IN 1888, JANUARY 23,**  
**AS SEEN IN AN INVERTING TELESCOPE.**

MEAN SYNODIC PERIODS.	
d	h
I. 0	22.6
II. 1	8.9
III. 1	21.3
IV. 2	17.7
V. 4	12.5
VI. 15	23.3
VII. 21	7.8
VIII. 79	22.0

## WASHINGTON MEAN TIMES OF GREATEST ELONGATION, ETC.

In the diagram on the preceding page, the points of the orbits marked "o" are those of the eastern elongation, as seen in an inverting telescope. The apparent positions of a satellite at any time may be marked on the diagram by counting around the orbit the interval in days and hours which has elapsed since the last east elongation. The times of these elongations may be found from the following tables. Mimas can be seen only within a few hours of each elongation: the time of every elongation visible at Washington is therefore given. The times of other elongations of any satellite in the same direction may be found by adding or subtracting any multiple of the period. For the three outer satellites the times of elongation and conjunction are given. The following abbreviations are used:—

E., East Elongation,  
I., Inferior Conjunction (north of planet),  
W., West Elongation,  
S., Superior Conjunction (south of planet).

## MIMAS.

*Greatest Elongations Visible at Washington.*

Jan. 1 15.4 W.	Jan. 30 9.2 E.	Mar. 3 8.7 E.	Apr. 11 11.4 W.	Oct. 23 15.0 W.	Dec. 1 17.7 E.
2 14.0 W.	Feb. 3 14.9 W.	8 13.2 W.	12 10.0 W.	29 18.0 E.	2 16.3 E.
3 12.7 W.	4 13.5 W.	9 11.8 W.	13 8.6 W.	30 16.6 E.	3 15.0 E.
4 11.3 W.	5 12.2 W.	10 10.4 W.	18 13.1 E.	31 15.3 E.	4 13.6 E.
5 9.9 W.	6 10.8 W.	11 9.0 W.	19 11.7 E.	Nov. 1 13.9 E.	10 16.6 W.
9 15.7 E.	7 9.4 W.	16 13.6 E.	20 10.3 E.	6 18.3 W.	11 15.2 W.
10 14.3 E.	12 13.7 E.	17 12.2 E.	21 9.0 E.	7 16.9 W.	12 13.8 W.
11 12.9 E.	13 12.3 E.	18 10.8 E.	26 13.4 W.	8 15.5 W.	13 12.5 W.
12 11.5 E.	14 10.9 E.	19 9.3 E.	27 12.0 W.	9 14.2 W.	14 11.1 W.
13 10.2 E.	15 9.6 E.	20 7.9 E.	28 10.6 W.	14 18.5 E.	18 16.8 E.
18 14.5 W.	16 8.2 E.	24 13.7 W.	29 9.2 W.	15 17.1 E.	19 15.4 E.
19 13.1 W.	20 14.0 W.	25 12.3 W.	May 5 12.4 E.	16 15.7 E.	20 14.0 E.
20 11.7 W.	21 12.6 W.	26 10.9 W.	6 11.0 E.	17 14.3 E.	21 12.6 E.
21 10.3 W.	22 11.2 W.	27 9.5 W.	7 9.6 E.	22 18.8 W.	22 11.3 E.
22 9.0 W.	23 9.8 W.	Apr. 2 12.5 E.	14 11.3 W.	23 17.4 W.	27 15.7 W.
26 14.8 E.	24 8.5 W.	3 11.1 E.	Oct. 15 14.7 E.	24 16.0 W.	28 14.3 W.
27 13.4 E.	29 12.9 E.	4 9.7 E.	20 19.2 W.	25 14.6 W.	29 12.9 W.
28 12.0 E.	Mar. 1 11.5 E.	5 8.3 E.	21 17.8 W.	26 13.2 W.	30 11.5 W.
29 10.6 E.	2 10.1 E.	10 12.7 W.	22 16.4 W.	30 19.1 E.	31 10.1 W.

## ENCELADUS.

Jan. 2 8.6 E.	Jan. 16 1.4 E.	Jan. 29 18.1 E.	Feb. 12 10.8 E.	Feb. 26 3.6 E.	Mar. 10 20.4 E.
3 17.5 E.	17 10.3 E.	31 3.0 E.	13 19.7 E.	27 12.5 E.	12 5.3 E.
5 2.4 E.	18 19.2 E.	Feb. 1 11.8 E.	15 4.5 E.	28 21.3 E.	13 14.2 E.
6 11.3 E.	20 4.0 E.	2 20.7 E.	16 13.4 E.	Mar. 1 6.2 E.	14 23.1 E.
7 20.2 E.	21 12.9 E.	4 5.6 E.	17 22.3 E.	2 15.0 E.	16 8.0 E.
9 5.0 E.	22 21.7 E.	5 14.4 E.	19 7.1 E.	3 23.9 E.	17 16.8 E.
10 13.9 E.	24 6.6 E.	6 23.3 E.	20 16.0 E.	5 8.8 E.	19 1.7 E.
11 22.8 E.	25 15.5 E.	8 8.2 E.	22 0.9 E.	6 17.8 E.	20 10.6 E.
13 7.7 E.	27 0.4 E.	9 17.1 E.	23 9.8 E.	8 2.7 E.	21 19.5 E.
14 16.6 E.	28 9.3 E.	11 2.0 E.	24 18.7 E.	9 11.6 E.	23 4.4 E.

## WASHINGTON MEAN TIMES OF GREATEST ELONGATIONS.

## ENCELADUS—(Concluded.)

Mar. 24 13.3 E. 25 22.2 E. 27 7.1 E. 28 16.0 E. 30 0.8 E.	Apr. 14 2.6 E. 15 11.5 E. 16 20.4 E. 18 5.3 E. 19 14.2 E.	May 4 16.0 E. 6 0.9 E. 7 9.8 E. 8 18.7 E. 10 3.6 E.	Nov. 1 14.7 E. 2 23.6 E. 4 8.5 E. 5 17.4 E. 7 2.3 E.	Nov. 22 4.1 E. 23 13.0 E. 24 21.9 E. 26 6.7 E. 27 15.6 E.	Dec. 12 17.3 E. 14 2.2 E. 15 11.1 E. 16 19.9 E. 18 4.8 E.
31 9.6 E. Apr. 1 18.5 E. 3 3.4 E. 4 12.3 E. 5 21.2 E.	20 23.1 E. 22 8.0 E. 23 16.9 E. 25 1.8 E. 26 10.7 E.	Oct. 18 21.9 E. 20 6.8 E. 21 15.7 E. 23 0.5 E. 24 9.4 E.	8 11.2 E. 9 20.1 E. 11 5.0 E. 12 13.9 E. 13 22.8 E.	29 0.5 E. 30 9.4 E. Dec. 1 18.3 E. 3 3.1 E. 4 12.0 E.	19 13.7 E. 20 22.6 E. 22 7.5 E. 23 16.4 E. 25 1.3 E.
7 6.1 E. 8 15.0 E. 9 23.9 E. 11 8.8 E. 12 17.7 E.	27 19.5 E. 29 4.4 E. 30 13.3 E. May 1 22.2 E. 3 7.1 E.	25 18.3 E. 27 3.2 E. 28 12.1 E. 29 21.0 E. 31 5.9 E.	15 7.7 E. 16 16.6 E. 18 1.5 E. 19 10.3 E. 20 19.2 E.	5 20.9 E. 7 5.8 E. 8 14.7 E. 9 23.6 E. 11 8.5 E.	26 10.1 E. 27 19.0 E. 29 3.9 E. 30 12.7 E. 31 21.6 E.

## TETHYS

Jan. 2 9.5 E. 4 6.8 E. 6 4.1 E. 8 1.4 E. 9 22.6 E.	Feb. 9 3.1 E. 11 0.4 E. 12 21.7 E. 14 19.0 E. 16 16.3 E.	Mar. 17 21.0 E. 19 18.3 E. 21 15.6 E. 23 12.9 E. 25 10.2 E.	Apr. 24 15.3 E. 26 12.6 E. 28 9.9 E. 30 7.2 E. May 2 4.6 E.	Oct. 19 4.8 E. 21 2.1 E. 22 23.4 E. 24 20.7 E. 26 18.0 E.	Nov. 25 23.1 E. 27 20.4 E. 29 17.6 E. Dec. 1 14.9 E. 3 12.2 E.
11 19.9 E. 13 17.2 E. 15 14.5 E. 17 11.7 E. 19 9.0 E.	18 13.6 E. 20 10.9 E. 22 8.2 E. 24 5.4 E. 26 2.7 E.	27 7.5 E. 29 4.8 E. 31 2.1 E. Apr. 1 23.4 E. 3 20.7 E.	4 1.9 E. 5 23.2 E. 7 20.5 E. 9 17.8 E. 11 15.1 E.	28 15.3 E. 30 12.7 E. Nov. 1 10.0 E. 3 7.4 E. 5 4.7 E.	5 9.5 E. 7 6.9 E. 9 4.2 E. 11 1.5 E. 12 22.8 E.
21 6.3 E. 23 3.6 E. 25 0.9 E. 26 22.1 E. 28 19.4 E.	28 0.0 E. 29 21.3 E. Mar. 2 18.6 E. 4 15.9 E. 6 13.3 E.	5 18.0 E. 7 15.3 E. 9 12.7 E. 11 10.0 E. 13 7.3 E.	Sept. 30 7.5 E. Oct. 2 4.8 E. 4 2.1 E. 5 23.4 E. 7 20.8 E.	7 2.1 E. 8 23.4 E. 10 20.7 E. 12 18.0 E. 14 15.3 E.	14 20.1 E. 16 17.4 E. 18 14.7 E. 20 12.0 E. 22 9.2 E.
30 16.6 E. Feb. 1 13.9 E. 3 11.2 E. 5 8.5 E. 7 5.8 E.	8 10.6 E. 10 7.8 E. 12 5.1 E. 14 2.4 E. 15 23.7 E.	15 4.6 E. 17 2.0 E. 18 23.3 E. 20 20.6 E. 22 17.9 E.	9 18.1 E. 11 15.5 E. 13 12.8 E. 15 10.2 E. 17 7.5 E.	16 12.6 E. 18 9.9 E. 20 7.2 E. 22 4.6 E. 24 1.9 E.	24 6.5 E. 26 3.8 E. 28 1.1 E. 29 22.4 E. 31 19.7 E.

## DIONE.

Jan. 1 5.3 E. 3 22.9 E. 6 16.6 E. 9 10.3 E. 12 3.9 E.	Feb. 3 1.0 E. 5 18.7 E. 8 12.3 E. 11 5.9 E. 13 23.5 E.	Mar. 6 20.9 E. 9 14.6 E. 12 8.2 E. 15 1.9 E. 17 19.5 E.	Apr. 8 17.0 E. 11 10.7 E. 14 4.4 E. 16 22.1 E. 19 15.8 E.	Oct. 28 9.9 E. 31 3.6 E. Nov. 2 21.3 E. 5 15.0 E. 8 8.7 E.	Nov. 30 6.2 E. Dec. 2 23.9 E. 5 17.5 E. 8 11.2 E. 11 4.8 E.
14 21.6 E. 17 15.2 E. 20 8.9 E. 23 2.5 E. 25 20.1 E.	16 17.2 E. 19 10.8 E. 22 4.5 E. 24 22.1 E. 27 15.8 E.	20 13.2 E. 23 6.8 E. 26 0.5 E. 28 18.2 E. 31 11.9 E.	22 9.5 E. 25 3.2 E. 27 20.9 E. 30 14.6 E. May 3 8.3 E.	11 2.4 E. 13 20.1 E. 16 13.7 E. 19 7.4 E. 22 1.1 E.	13 22.5 E. 16 16.1 E. 19 9.8 E. 22 3.5 E. 24 21.2 E.
28 13.7 E. 31 7.4 E.	Mar. 1 9.5 E. 4 3.2 E.	Apr. 3 5.5 E. 5 23.2 E.	6 2.0 E. 8 19.7 E.	24 18.8 E. 27 12.5 E.	27 14.9 E. 30 8.6 E.

RHEA.				TITAN.				HYPERION.			
d	h	d	h	d	h	d	h	d	h	d	h
Jan. 2	7.6 E.	Apr. 19	15.8 E.	Jan. 3	14 W.	Apr. 7	23 W.	Jan. 2	15 E.	May 8	23 E.
6	19.9 E.	24	4.3 E.	7	13 S.	11	23 S.	7	22 I.	14	9 I.
11	8.2 E.	28	16.8 E.	11	12 E.	15	23 E.	13	5 W.	19	17 W.
15	20.4 E.	May 3	5.3 E.	15	11 I.	19	22 I.	18	12 S.	25	1 S.
20	8.7 E.	7	17.8 E.	19	11 W.	23	22 W.	23	19 E.	30	10 E.
24	21.0 E.	Oct. 8	14.1 E.	23	10 S.	Oct. 25	7 E.	29	2 I.	Oct. 11	9 I.
29	9.3 E.	13	2.6 E.	27	9 E.	29	6 I.	Feb. 3	9 W.	16	17 W.
Feb. 2	21.6 E.	17	15.2 E.	31	9 I.	Nov. 2	6 W.	8	16 S.	22	2 S.
7	9.9 E.	22	3.7 E.	Feb. 4	8 W.	6	6 S.	13	22 E.	27	10 E.
11	22.1 E.	26	16.2 E.	8	7 S.	10	6 E.	19	5 I.	Nov. 1	18 I.
16	10.4 E.	31	4.7 E.	12	7 E.	14	5 I.	24	12 W.	7	3 W.
20	22.7 E.	Nov. 4	17.2 E.	16	6 I.	18	5 W.	29	19 S.	12	11 S.
25	11.0 E.	9	5.6 E.	20	5 W.	22	5 S.	Mar. 6	3 E.	17	19 E.
29	23.3 E.	13	18.1 E.	24	4 S.	26	5 E.	11	10 I.	23	2 I.
Mar. 5	11.7 E.	18	6.5 E.	28	4 E.	30	4 I.	16	18 W.	28	10 W.
10	0.1 E.	22	18.9 E.	Mar. 3	3 I.	Dec. 4	4 W.	22	1 S.	Dec. 3	18 S.
14	12.5 E.	27	7.3 E.	7	2 W.	8	3 S.	27	8 E.	9	0 E.
19	0.9 E.	Dec. 1	19.7 E.	11	1 S.	12	3 E.	Apr. 1	16 I.	14	7 I.
23	13.2 E.	6	8.1 E.	15	1 E.	16	2 I.	7	0 W.	19	15 W.
28	1.6 E.	10	20.4 E.	19	0 I.	20	2 W.	12	8 S.	24	22 S.
Apr. 1	14.0 E.	15	8.8 E.	23	0 W.	24	2 S.	17	15 E.	30	5 E.
6	2.4 E.	19	21.1 E.	26	23 S.	28	1 E.	23	0 I.		
10	14.8 E.	24	9.4 E.	30	23 E.	32	0 I.	28	8 W.	1889	
15	3.3 E.	28	21.8 E.	Apr. 3	23 I.	36	0 W.	May 3	15 S.	Jan. 4	12 I.

JAPETUS	West Elongation	January 13	March 31	June 20	September 9	November 29
	Superior Conjunction	February 2	April 20	July 10	September 30	December 19
	East Elongation	February 21	May 10	July 31	October 20	
	Inferior Conjunction	March 12	May 31	August 20	November 9	

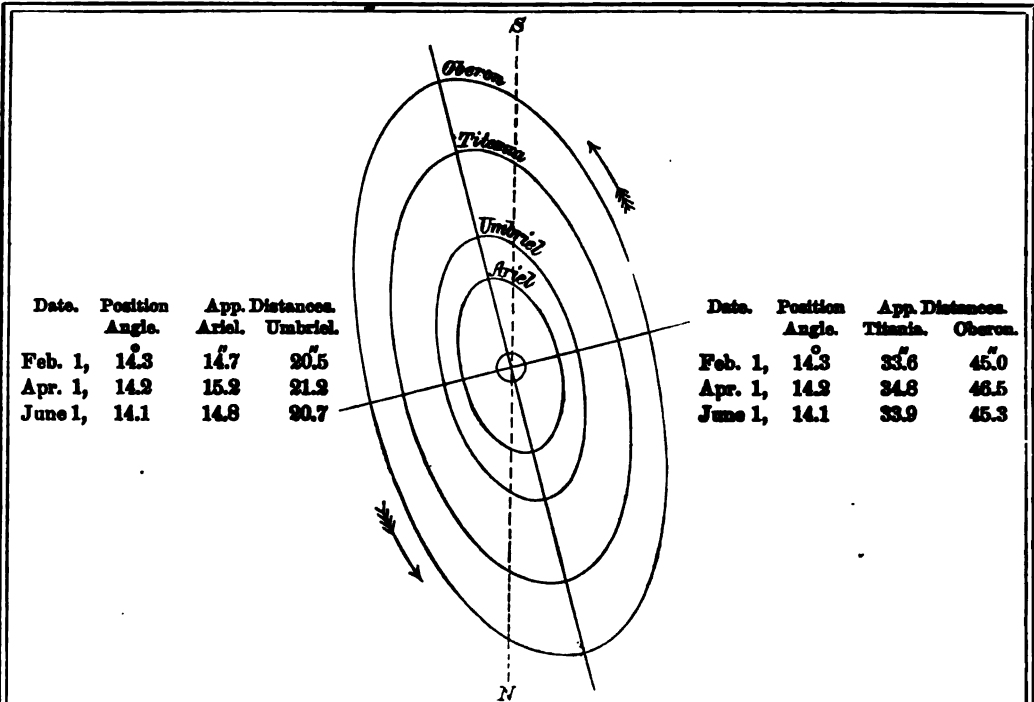
# THE APPARENT ELEMENTS OF SATURN'S RINGS.

Greenwich Mean Noon.	a	b	p	l	l'	Earth's Longitude from Saturn counted on Plane of Ring from the Ring's As- cending Node on	
	Outer Major Axis.	Outer Minor Axis.	Inclination of Northern Semi-Minor Axis to Circle of Declination from North to East.	The Elevation of the Earth above the Plane of the Ring.	The Elevation of the Sun above the Plane of the Ring.	Equator.	Ecliptic.
Jan. 0	45.80	15.10	— 7 25.7	— 19 15.4	— 20 9.9	183 12.4	140 37.3
20	46.26	15.71	7 27.3	19 51.1	19 56.1	181 41.2	139 6.2
Feb. 9	46.01	16.08	7 28.7	20 27.2	19 42.1	180 5.8	137 30.8
29	45.11	16.12	7 29.5	20 56.0	19 28.0	178 47.7	136 12.8
Mar. 20	43.76	15.83	7 29.9	21 12.1	19 13.7	178 3.6	135 28.8
Apr. 9	42.23	15.28	— 7 29.9	— 21 13.2	— 18 59.2	178 2.3	135 27.6
29	40.71	14.58	7 29.7	20 59.5	18 44.6	178 44.4	136 9.8
May 19	39.36	13.81	7 28.8	20 32.2	18 29.8	180 4.6	137 30.1
June 8	38.28	13.03	7 27.3	19 53.6	18 14.8	181 55.1	139 20.7
28	37.52	12.28	7 25.0	19 5.8	17 59.8	184 7.3	141 32.9
July 18	37.09	11.58	— 7 21.6	— 18 11.4	— 17 44.5	186 32.2	143 57.9
Aug. 7	37.01	10.96	7 17.3	17 13.3	17 29.1	189 1.5	146 27.3
27	37.27	10.43	7 12.3	16 14.6	17 13.6	191 27.4	148 53.3
Sept. 16	37.89	10.01	7 7.0	15 19.3	16 57.9	193 41.6	151 7.6
Oct. 6	38.84	9.74	7 2.0	14 31.4	16 42.0	195 36.5	153 2.6
26	40.08	9.64	— 6 57.9	— 13 55.5	— 16 26.1	197 3.8	154 30.0
Nov. 15	41.53	9.76	6 55.4	13 35.2	16 10.1	197 56.6	155 22.8
Dec. 5	43.06	10.10	6 54.9	13 33.4	15 53.9	198 9.3	155 35.6
25	44.45	10.64	6 56.5	13 50.9	15 37.5	197 41.0	155 7.4
31	44.81	10.83	— 6 57.3	— 13 59.4	— 15 32.7	197 25.2	154 51.6

The factor to be multiplied by *a* and *b* to obtain the axes of—

The inner ellipse of the outer ring	= 0.8801	log factor = 9.9445
The outer ellipse of the inner ring	= 0.8599	log factor = 9.9344
The inner ellipse of the inner ring	= 0.6650	log factor = 9.8228
The inner ellipse of the dusky ring	= 0.5486	log factor = 9.7392

NOTE.—The negative sign of *l* indicates that the visible surface of the ring is the southern one.

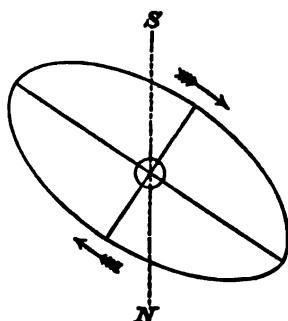


APPARENT ORBITS OF THE SATELLITES OF URANUS IN 1888,  
AS SEEN IN AN INVERTING TELESCOPE.

WASHINGTON MEAN TIMES OF GREATEST ELONGATIONS.

ARIEL.		UMBRIEL.		TITANIA.		OBERON.
North.	South.	North.	South.	North.	South.	North and South.
d h	d h	d h	d h	d h	d h	d h
Jan. 1 8.8	Jan. 2 15.1	Jan. 3 0.9	Jan. 5 2.6	Jan. 3 3.4	Jan. 7 11.9	Jan. 3 13.4 S.
8 22.3	10 4.5	11 7.8	13 9.5	11 20.4	16 4.8	10 7.0 N.
16 11.7	17 18.0	19 14.7	21 16.4	20 13.3	24 21.7	17 0.5 S.
24 1.2	25 7.4	27 21.6	29 23.3	29 6.2	Feb. 2 14.6	23 18.0 N.
31 14.7	Feb. 1 20.9	Feb. 5 4.5	Feb. 7 6.2	Feb. 6 23.1	11 7.6	30 11.6 S.
Feb. 8 4.1	9 10.3	13 11.4	15 13.1	15 16.0	20 0.5	Feb. 6 5.1 N.
15 17.5	16 23.8	21 18.3	23 20.0	24 8.9	28 17.4	12 22.6 S.
23 7.0	24 13.2	Mar. 1 1.2	Mar. 3 2.9	Mar. 4 1.8	Mar. 8 10.3	19 16.1 N.
Mar. 1 20.4	Mar. 3 2.7	9 8.1	11 9.8	12 18.7	17 3.2	26 9.7 S.
9 9.9	10 16.1	17 15.0	19 16.7	21 11.7	25 20.1	Mar. 4 3.2 N.
16 23.5	18 5.6	25 21.9	27 23.6	30 4.6	Apr. 3 13.1	10 20.8 S.
24 12.8	25 19.1	Apr. 3 4.8	Apr. 5 6.5	Apr. 7 21.5	12 6.0	17 14.3 N.
Apr. 1 2.3	Apr. 2 8.5	11 11.7	13 13.4	16 14.4	20 22.9	24 7.9 S.
8 15.7	9 22.0	19 18.6	21 20.4	25 7.4	29 15.8	31 1.4 N.
16 5.2	17 11.4	28 1.6	30 3.3	May 4 0.3	May 8 8.8	Apr. 6 18.9 S.
23 18.7	25 0.9	May 6 8.5	May 8 10.2	12 17.3	17 1.7	13 12.5 N.
May 1 8.1	May 2 14.3	14 15.4	16 17.1	21 10.2	25 18.7	20 6.0 S.
8 21.6	10 3.8	22 22.3	25 0.1	30 3.1	June 3 11.6	26 23.6 N.
16 11.1	17 17.3	31 5.3	June 2 7.0	June 7 22.1	12 4.6	May 3 17.1 S.
24 0.5	25 6.8	June 8 12.2	10 13.9	16 13.0	20 21.5	10 10.7 N.
Jan. 14.0	June 1 20.3	16 19.1	18 20.9	25 6.0	29 14.4	17 4.2 S.
June 8 3.5	9 9.7	25 2.1	27 3.8	July 3 22.9	July 8 7.4	23 21.8 N.
15 17.0	16 23.2	July 3 9.0	July 5 10.7	12 15.9	17 0.3	30 15.3 S.
23 6.5	24 12.7					June 6 8.9 N.
30 19.9	July 2 2.2					13 2.4 S.
Period of Ariel,		2 12.489		Period of Titania,		8 16.942
Period of Umbriel,		4 3.460		Period of Oberon,		13 11.119

NOTE.—For Ariel only every third elongation is given, and for Umbriel every alternate one. The intermediate ones may be found by adding multiples of the period of the satellite.



Date.	Position Angle.	Apparent Distance.
Jan. 14,	234.7	16.7
Sept. 14,	237.1	16.6
Nov. 17,	238.8	17.0

*APPARENT ORBIT OF THE SATELLITE OF NEPTUNE IN 1888,  
AS SEEN IN AN INVERTING TELESCOPE.*

WASHINGTON MEAN TIMES OF GREATEST ELONGATIONS.

South West.	North East.	South West.	North East.	South West.	North East.
Jan. d h 2 0.9 7 22.0 13 19.0 19 16.1 25 13.1	Jan. d h 4 23.4 10 20.5 16 17.5 22 14.6 28 11.6	Aug. d h 29 23.3 Sept. 4 20.3 10 17.3 16 14.3 22 11.4	Sept. d h 1 21.8 7 18.8 13 15.8 19 12.8 25 9.9	Nov. d h 2 14.5 8 11.5 14 8.5 20 5.6 26 2.6	Nov. d h 5 13.0 11 10.0 17 7.1 23 4.1 29 1.1
Feb. d h 31 10.1 6 7.2 12 4.2 18 1.3 23 22.3 29 19.4	Feb. d h 3 8.7 9 5.7 15 2.8 20 23.8 26 20.8 Mar. 3 17.9	Oct. d h 28 8.4 4 5.4 10 2.4 15 23.4 21 20.4	Oct. d h 1 6.9 7 3.9 13 0.9 18 21.9 24 19.0 30 16.0	Dec. d h 1 23.6 7 20.7 13 17.7 19 14.7 25 11.7 31 8.8	Dec. d h 4 22.2 10 19.2 16 16.2 22 13.2 28 10.2 34 7.3

The above times are those of each passage of the satellite through an apsis of its apparent orbit. The position of the satellite at any other time may be found by measuring around the orbit from the apsis last passed through, remembering that the radius vector of the satellite describes equal areas in equal times.

Period of the satellite of Neptune,  $5^d 21^h.045$ .

In the above diagrams, the central circle represents the planet, and is on the same scale as the orbits.



## WASHINGTON MEAN TIME.

## PLANETARY CONSTELLATIONS.

Jan.			d h m			Mar. 30			d h m		
1	23	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
2	18	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
3	8	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
4	19	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
5	15	46	♂	♂	♀	♂	♂	♂	♂	♂	♂
5	18	22	♂	♂	♀	♂	♂	♂	♂	♂	♂
7	7	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	18	10	♂	♂	♀	♂	♂	♂	♂	♂	♂
9	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
9	6	36	♂	♂	♀	♂	♂	♂	♂	♂	♂
12	10	36	♂	♂	♀	♂	♂	♂	♂	♂	♂
18	3	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	3	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
22	15	43	♂	♂	♀	♂	♂	♂	♂	♂	♂
22	21	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
23	16	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	6	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	20	20	♂	♂	♀	♂	♂	♂	♂	♂	♂
28	-	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
Feb. 1	23	47	♂	♂	♀	♂	♂	♂	♂	♂	♂
2	14	47	♂	♂	♀	♂	♂	♂	♂	♂	♂
5	7	27	♂	♂	♀	♂	♂	♂	♂	♂	♂
6	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	3	43	♂	♂	♀	♂	♂	♂	♂	♂	♂
11	-	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
11	17	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
12	16	11	♂	♂	♀	♂	♂	♂	♂	♂	♂
15	19	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
16	7	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
16	15	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
19	0	6	♂	♂	♀	♂	♂	♂	♂	♂	♂
23	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
23	17	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	2	57	♂	♂	♀	♂	♂	♂	♂	♂	♂
26	15	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	20	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
29	6	23	♂	♂	♀	♂	♂	♂	♂	♂	♂
Mar. 1	5	45	♂	♂	♀	♂	♂	♂	♂	♂	♂
3	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
3	17	28	♂	♂	♀	♂	♂	♂	♂	♂	♂
3	18	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
9	4	28	♂	♂	♀	♂	♂	♂	♂	♂	♂
10	13	8	♂	♂	♀	♂	♂	♂	♂	♂	♂
16	13	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
17	8	23	♂	♂	♀	♂	♂	♂	♂	♂	♂
19	11	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	14	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
22	10	46	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	8	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	14	50	♂	♂	♀	♂	♂	♂	♂	♂	♂
28	9	7	♂	♂	♀	♂	♂	♂	♂	♂	♂
30	9	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
Mar. 30	10	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
31	1	28	♂	♂	♀	♂	♂	♂	♂	♂	♂
31	7	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
Apr. 2	4	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
3	20	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	5	58	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	8	8	♂	♂	♀	♂	♂	♂	♂	♂	♂
10	13	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
13	12	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
13	16	32	♂	♂	♀	♂	♂	♂	♂	♂	♂
18	16	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
18	19	21	♂	♂	♀	♂	♂	♂	♂	♂	♂
20	15	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
23	23	57	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	4	25	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	16	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	8	8	♂	♂	♀	♂	♂	♂	♂	♂	♂
May 5	1	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	15	45	♂	♂	♀	♂	♂	♂	♂	♂	♂
9	16	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
10	5	3	♂	♂	♀	♂	♂	♂	♂	♂	♂
10	7	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
11	0	30	♂	♂	♀	♂	♂	♂	♂	♂	♂
14	6	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
14	15	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
16	2	28	♂	♂	♀	♂	♂	♂	♂	♂	♂
19	17	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
20	10	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	5	42	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	8	18	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	12	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
21	13	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	13	41	♂	♂	♀	♂	♂	♂	♂	♂	♂
24	15	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
31	20	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
June 5	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
6	12	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
7	8	48	♂	♂	♀	♂	♂	♂	♂	♂	♂
8	2	44	♂	♂	♀	♂	♂	♂	♂	♂	♂
11	3	55	♂	♂	♀	♂	♂	♂	♂	♂	♂
12	3	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
12	14	40	♂	♂	♀	♂	♂	♂	♂	♂	♂
17	1	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
17	15	11	♂	♂	♀	♂	♂	♂	♂	♂	♂
17	19	43	♂	♂	♀	♂	♂	♂	♂	♂	♂
19	14	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
19	23	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
20	7	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
20	18	27	♂	♂	♀	♂	♂	♂	♂	♂	♂
25	6	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
27	6	-	♂	♂	♀	♂	♂	♂	♂	♂	♂
July 3	2	-	♂	♂	♀	♂	♂	♂	♂	♂	♂

WASHINGTON MEAN TIME.

## PLANETARY CONSTELLATIONS.

July	d	h	m		d	h	m		Sept. 23	d	h	m	
	4	4	-	☐ ☉ ☉		5	-	☉ ☉ ☉		23	5	-	in Aphelion.
	4	17	34	☉ ☉ ☉		18	57	☉ ☉ ☉		24	18	57	☉ ☉ ☉
	8	-	-	☉ ☉ ☉ eclipsed, invis. at Wash.		30	22	16		30	22	16	☉ ☉ ☉
	8	12	-	☉ ☉ ☉ Inferior.		5	1	56		5	1	56	☉ ☉ ☉
	8	12	-	☉ ☉ ☉		6	10	43		6	10	43	☉ ☉ ☉
	8	12	9	☉ ☉ ☉		6	12	0		6	12	0	☉ ☉ ☉
	8	12	14	☉ ☉ ☉		7	23	-		7	23	-	☉ ☉ ☉ greatest elong. E.
	10	2	36	☉ ☉ ☉		8	7	31		8	7	31	☉ ☉ ☉
	11	2	-	☉ ☉ ☉ Superior.		9	6	-		9	6	-	☉ ☉ ☉
	14	21	18	☉ ☉ ☉		9	10	9		9	10	9	☉ ☉ ☉
	15	19	59	☉ ☉ ☉		9	12	-		9	12	-	☉ ☉ ☉ in ☉
	17	15	-	☉ ☉ ☉ greatest Hel. Lat. S.		9	20	-		9	20	-	☉ ☉ ☉
	17	23	30	☉ ☉ ☉		13	14	-		13	14	-	☉ ☉ ☉ greatest Hel. Lat. S.
	19	3	-	☉ ☉ ☉ Stationary.		19	19	-		19	19	-	☉ ☉ ☉ Stationary.
	22	-	-	☉ ☉ ☉ eclipsed, vis. at Wa-h.		22	0	57		22	0	57	☉ ☉ ☉
	22	2	-	☐ ☉ ☉		28	11	3		28	11	3	☉ ☉ ☉
	22	22	-	☉ ☉ ☉ Stationary.		31	7	-		31	7	-	☉ ☉ ☉ Inferior.
	23	11	-	☉ ☉ ☉ in Perihelion.		1	15	-		1	15	-	☉ ☉ ☉ in ☉
	26	20	-	☉ ☉ ☉		1	15	33		1	15	33	☉ ☉ ☉
	28	14	-	☉ ☉ ☉ greatest elong. W. 19 31		2	18	43		2	18	43	☉ ☉ ☉
Aug.	1	2	39	☉ ☉ ☉		5	2	13		5	2	13	☉ ☉ ☉
	1	8	-	☉ ☉ ☉		5	9	26		5	9	26	☉ ☉ ☉
	5	15	43	☉ ☉ ☉		6	5	-		6	5	-	☉ ☉ ☉ in Perihelion.
	5	16	-	☉ ☉ ☉ in ☉		7	6	44		7	6	44	☉ ☉ ☉
	6	16	21	☉ ☉ ☉		8	3	-		8	3	-	☉ ☉ ☉ Stationary.
	7	-	-	☉ ☉ ☉ eclipsed, invis. at Wash.		8	20	-		8	20	-	☉ ☉ ☉ greatest Hel. Lat. S.
	7	15	32	☉ ☉ ☉		11	6	-		11	6	-	☐ ☉ ☉
	10	6	-	☉ ☉ ☉ in Perihelion.		12	21	-		12	21	-	☉ ☉ ☉ in Aphelion.
	11	4	22	☉ ☉ ☉		16	13	-		16	13	-	☉ ☉ ☉ greatest Hel. Lat. N.
	13	3	32	☉ ☉ ☉		16	13	-		16	13	-	☉ ☉ ☉ greatest elong. W. 19 34
	13	11	-	☉ ☉ ☉		18	5	48		18	5	48	☉ ☉ ☉
	14	6	27	☉ ☉ ☉		22	1	-		22	1	-	☉ ☉ ☉
	14	11	-	☉ ☉ ☉ greatest Hel. Lat. N.		24	19	57		24	19	57	☉ ☉ ☉
	19	15	-	☐ ☉ ☉		29	4	29		29	4	29	☉ ☉ ☉
	20	14	-	☉ ☉ ☉ greatest Hel. Lat. N.		30	4	-		30	4	-	☉ ☉ ☉ Stationary.
	23	8	-	☉ ☉ ☉ Superior.		Dec. 1	15	37		1	15	37	☉ ☉ ☉
	24	10	-	☐ ☉ ☉		2	23	30		2	23	30	☉ ☉ ☉
	28	11	23	☉ ☉ ☉		3	1	-		3	1	-	☉ ☉ ☉ in Perihelion.
Sept.	3	7	24	☉ ☉ ☉		5	8	46		5	8	46	☉ ☉ ☉
	3	19	-	☉ ☉ ☉ Stationary.		5	9	-		5	9	-	☉ ☉ ☉ greatest Hel. Lat. S.
	6	6	59	☉ ☉ ☉		6	5	14		6	5	14	☉ ☉ ☉
	6	13	44	☉ ☉ ☉		8	6	-		8	6	-	☉ ☉ ☉
	7	13	47	☉ ☉ ☉		10	0	-		10	0	-	☉ ☉ ☉ in ☉
	10	16	40	☉ ☉ ☉		15	10	25		15	10	25	☉ ☉ ☉
	10	16	50	☉ ☉ ☉		16	13	-		16	13	-	☉ ☉ ☉
	10	21	-	☉ ☉ ☉		20	5	-		20	5	-	☉ ☉ ☉ in Aphelion.
	13	0	-	☉ ☉ ☉ in ☉		20	16	-		20	16	-	☉ ☉ ☉ enters ☉, Winter com.
	18	10	-	☉ ☉ ☉		22	0	56		22	0	56	☉ ☉ ☉
	19	0	-	☉ ☉ ☉		26	14	30		26	14	30	☉ ☉ ☉
	19	3	-	☉ ☉ ☉		28	2	-		28	2	-	☉ ☉ ☉ Superior.
	21	22	-	☉ ☉ ☉ enters ☉, Autumn com.		30	20	57		30	20	57	☉ ☉ ☉
	22	2	-	☉ ☉ ☉ α Virginis . . *		31	2	-		31	2	-	☉ ☉ ☉ Perigee.
	22	8	-	☉ ☉ ☉ β Scorpii . . *									

## POSITIONS OF OBSERVATORIES.

(North Latitudes and West Longitudes are Considered Positive.)

Place.	Latitude.	Reduction to Geocentric Latitude.	Log $\rho$ .	Longitude	
				From Washington.	From Greenwich.
Åbo . . . . .	+ 60° 26' 56.8	- 9 53.5	9.998902	<sup>h</sup> <sup>m</sup> <sup>s</sup> - 6 37 18.50	<sup>h</sup> <sup>m</sup> <sup>s</sup> - 1 29 6.41
Adelaide . . . . .	- 34 55 33.8	+ 10 47.6	9.999527	- 14 22 32.51	- 9 14 20.42
Albany . . . . .	+ 42 39 49.5	- 11 28.2	9.999336	- 0 13 12.87	+ 4 54 59.22
Alfred (N. Y.) . . . . .	+ 42 15 19.8	- 11 27.2	9.999346	+ 0 2 55.00	+ 5 11 7.09
Algier . . . . .	+ 36 45 2.7	- 11 1.6	9.999483	- 5 20 23.48	- 0 12 11.39
Allegheny . . . . .	+ 40 27 41.6	- 11 21.6	9.999391	+ 0 11 50.84	+ 5 20 2.93
Altona . . . . .	+ 53 32 45.3	- 11 0.8	9.999063	- 5 47 58.44	- 0 39 46.35
Amherst . . . . .	+ 42 22 15.6	- 11 27.5	9.999343	- 0 18 4.8	+ 4 50 7.3
Annapolis . . . . .	+ 38 58 53.5	- 11 15.0	9.999428	- 0 2 15.60	+ 5 5 56.49
Ann Arbor . . . . .	+ 42 16 48.0	- 11 27.3	9.999346	+ 0 26 43.10	+ 5 34 55.19
Armagh . . . . .	+ 54 21 12.7	- 10 54.9	9.999043	- 4 41 36.6	+ 0 26 35.5
Athens . . . . .	+ 37 58 20.0	- 11 9.4	9.999453	- 6 43 7.8	- 1 34 55.7
Berlin . . . . .	+ 52 30 16.7	- 11 7.7	9.999088	- 6 1 47.00	- 0 53 34.91
Berne . . . . .	+ 46 57 8.7	- 11 29.2	9.999227	- 5 37 58.1	- 0 29 46.0
Bethlehem . . . . .	+ 40 36 23.9	- 11 22.2	9.999388	- 0 6 40.19	+ 5 1 31.90
Birr Castle . . . . .	+ 53 5 47.0	- 11 3.9	9.999074	- 4 36 31.2	+ 0 31 40.9
Bologna . . . . .	+ 44 29 47.0	- 11 30.5	9.999289	- 5 53 36.7	- 0 45 24.6
Bonn . . . . .	+ 50 43 45.0	- 11 17.3	9.999132	- 5 36 35.38	- 0 28 23.29
Bothkamp . . . . .	+ 54 12 9.6	- 10 56.0	9.999047	- 5 48 42.9	- 0 40 30.8
Breslau . . . . .	+ 51 6 56.5	- 11 15.4	9.999122	- 6 16 20.80	- 1 8 8.71
Brussels . . . . .	+ 50 51 10.5	- 11 16.8	9.999129	- 5 25 40.7	- 0 17 28.6
Cambridge (England) . . . . .	+ 52 12 51.6	- 11 9.4	9.999095	- 5 8 34.84	- 0 0 22.75
Cambridge (Mass.) . . . . .	+ 42 22 48.3	- 11 27.6	9.999343	- 0 23 41.11	+ 4 44 30.98
Cape of Good Hope . . . . .	- 33 56 3.4	+ 10 39.0	9.999550	- 6 22 7.1	- 1 13 55.0
Chapultepec . . . . .	+ 19 25 17.5	- 7 12.0	9.999841	+ 1 28 26.15	+ 6 36 38.24
Charkow . . . . .	+ 50 0 10.2	- 11 20.5	9.999150	- 7 33 6.8	- 2 24 54.7
Chicago . . . . .	+ 41 50 1.0	- 11 26.2	9.999357	+ 0 42 14.69	+ 5 50 26.78
Christiania . . . . .	+ 59 54 43.7	- 10 0.2	9.998914	- 5 51 5.94	- 0 42 53.85
Cincinnati (New Obs.) . . . . .	+ 39 8 19.5	- 11 15.8	9.999424	+ 0 29 29.20	+ 5 37 41.29
Cincinnati (Old Obs.) . . . . .	+ 39 6 26.5	- 11 15.6	9.999425	+ 0 29 46.85	+ 5 37 58.94
Clinton . . . . .	+ 43 3 17.0	- 11 28.9	9.999326	- 0 6 34.65	+ 5 1 37.44
Coimbra . . . . .	+ 40 12 25.8	- 11 20.6	9.999398	- 4 34 37.6	+ 0 33 34.5
Copenhagen . . . . .	+ 55 41 13.6	- 10 43.9	9.999011	- 5 58 31.3	- 0 50 19.2
Cordoba . . . . .	- 31 25 15.4	+ 10 13.5	9.999608	- 0 51 27.0	+ 4 16 45.1
Cracow . . . . .	+ 50 3 50.0	- 11 20.3	9.999149	- 6 28 2.46	- 1 19 50.37
Dantzic . . . . .	+ 54 21 18.0	- 10 54.9	9.999043	- 6 22 51.4	- 1 14 39.3
Dorpat . . . . .	+ 58 22 47.4	- 10 17.6	9.998948	- 6 55 5.6	- 1 46 53.5
Dresden . . . . .	+ 51 2 16.8	- 11 15.8	9.999124	- 6 3 6.93	- 0 54 54.84
Dublin . . . . .	+ 53 23 13	- 11 1.9	9.999066	- 4 42 50	+ 0 25 22
Düsseldorf . . . . .	+ 51 12 25	- 11 15.0	9.999120	- 5 35 17	- 0 27 5
Dun Echt . . . . .	+ 57 9 36	- 10 30.2	9.998977	- 4 58 32.1	+ 0 9 40.0
Durham . . . . .	+ 54 46 6.2	- 10 51.6	9.999033	- 5 1 52.3	+ 0 6 19.8
Edinburgh . . . . .	+ 55 57 23.2	- 10 41.5	9.999005	- 4 55 29.04	+ 0 12 43.05
Florence . . . . .	+ 43 46 4.1	- 11 29.9	9.999308	- 5 53 13.6	- 0 45 1.5
Geneva . . . . .	+ 46 11 58.8	- 11 30.1	9.999246	- 5 32 48.86	- 0 24 36.77
Georgetown . . . . .	+ 38 54 26.2	- 11 14.6	9.999430	+ 0 0 6.20	+ 5 8 18.29
Glasgow (Missouri) . . . . .	+ 39 13 45.6	- 11 16.2	9.999422	+ 1 3 5.93	+ 6 11 18.02

## POSITIONS OF OBSERVATORIES.

*(North Latitudes and West Longitudes are Considered Positive.)*

Place.	Latitude.	Reduction to Geocentric Latitude.	Log $\rho$ .	Longitude	
				From Washington.	From Greenwich.
				<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Glasgow ( <i>Scotland</i> ) .	+55° 52' 42.8"	— 10 42.2	9.999006	— 4 51 1.5	+ 0 17 10.6
Göttingen . . .	+51 31 47.9	— 11 13.3	9.999112	— 5 47 58.33	— 0 39 46.24
Gotha . . .	+50 56 37.5	— 11 16.3	9.999127	— 5 51 2.62	— 0 42 50.53
Greenwich . . .	+51 28 38.4	— 11 13.6	9.999113	— 5 8 12.09	0 0 0
Hamburg . . .	+53 33 7.0	— 11 0.8	9.999062	— 5 48 5.8	— 0 39 53.7
Hanover . . .	+43 42 15	— 11 29.8	9.999309	— 0 19 4.13	+ 4 49 7.96
Hastings-on-Hudson.	+40 59 25	— 11 23.6	9.999378	— 0 12 42.4	+ 4 55 29.7
Haverford . . .	+40 0 40.1	— 11 19.8	9.999402	— 0 6 59.34	+ 5 1 12.75
Helsingfors . . .	+60 9 43.3	— 9 57.1	9.998909	— 6 48 1.25	— 1 39 49.16
Hudson . . .	+41 14 42.6	— 11 24.4	9.999371	+ 0 17 32.06	+ 5 25 44.15
Karlsruhe . . .	+49 0 29.6	— 11 24.2	9.999175	— 5 41 48.60	— 0 33 36.51
Kasan . . .	+55 47 24.2	— 10 43.0	9.999009	— 8 24 41.0	— 3 16 28.9
Kew . . .	+51 28 6	— 11 13.6	9.999114	— 5 6 57.0	+ 0 1 15.1
Kiel . . .	+54 20 29.7	— 10 55.0	9.999043	— 5 48 47.85	— 0 40 35.76
Kiew . . .	+50 27 11.1	— 11 18.6	9.999139	— 7 10 12.73	— 2 2 0.64
Königsberg . . .	+54 42 50.6	— 10 52.0	9.999034	— 6 30 11.00	— 1 21 58.91
Kremsmünster . .	+48 3 23.7	— 11 27.0	9.999199	— 6 4 44.3	— 0 56 32.2
Leiden . . .	+52 9 20.0	— 11 9.8	9.999097	— 5 26 8.44	— 0 17 56.35
Leipzig . . .	+51 20 6.3	— 11 14.3	9.999117	— 5 57 46.11	— 0 49 34.02
Leyton . . .	+51 34 34	— 11 13.0	9.999111	— 5 8 11.22	+ 0 0 0.87
Lisbon ( <i>Marine Obs.</i> )	+38 42 17.6	— 11 13.5	9.999435	— 4 31 47.1	+ 0 36 25.0
Lisbon ( <i>Royal Obs.</i> )	+38 42 31.3	— 11 13.6	9.999435	— 4 31 27.41	+ 0 36 44.68
Liverpool . . .	+53 24 4	— 11 1.8	9.999066	— 4 55 54.9	+ 0 12 17.2
Lübec . . .	+53 51 31.2	— 10 58.6	9.999055	— 5 50 57.64	— 0 42 45.55
Lund . . .	+55 41 52.1	— 10 43.8	9.999011	— 6 0 57.11	— 0 52 45.02
Lyons . . .	+45 41 40.0	— 11 30.5	9.999259	— 5 27 19.95	— 0 19 7.86
Madison . . .	+43 4 36.7	— 11 28.9	9.999325	+ 0 49 25.80	+ 5 57 37.9
Madras . . .	+13 4 8.1	— 5 3.3	9.999926	— 10 29 11.5	+ 5 20 59.4
Madrid . . .	+40 24 30.0	— 11 21.4	9.999393	— 4 53 26.7	+ 0 14 45.4
Manheim . . .	+49 29 11.0	— 11 22.5	9.999163	— 5 42 2.61	— 0 33 50.52
Marburg . . .	+50 48 46.9	— 11 16.9	9.999130	— 5 43 17.1	— 0 35 5.0
Markree . . .	+54 10 31.8	— 10 56.2	9.999047	— 4 34 23.7	+ 0 33 48.4
Marseilles . . .	+43 18 19.1	— 11 29.3	9.999320	— 5 29 46.73	— 0 21 34.64
Melbourne . . .	— 37 49 53.3	+ 11 8.6	9.999456	— 14 48 6.9	— 9 39 54.17
Mexico . . .	+19 26 1.3	— 7 12.2	9.999840	+ 1 28 14.58	+ 6 36 26.67
Milan . . .	+45 27 59.2	— 11 30.6	9.999265	— 5 44 58.06	— 0 36 45.97
Modena . . .	+44 38 52.8	— 11 30.6	9.999285	— 5 51 54.9	— 0 43 42.8
Montsouris . . .	+48 49 18.0	— 11 24.8	9.999180	— 5 17 32.77	— 0 9 20.68
Moscow . . .	+55 45 19.8	— 10 43.3	9.999009	— 7 38 29.0	— 2 30 16.9
Mount Hamilton .	+37 20 23.5	— 11 5.5	9.999468	+ 2 58 22.05	+ 8 6 34.14
Munich . . .	+48 8 45.5	— 11 26.7	9.999197	— 5 54 38.22	— 0 46 26.13
Naples . . .	+40 51 45.4	— 11 23.1	9.999381	— 6 5 13.0	— 0 57 0.9
Nashville . . .	+36 8 58.2	— 10 57.3	9.999497	+ 0 39 0.68	+ 5 47 12.77
Neuchâtel . . .	+46 59 51.0	— 11 29.1	9.999226	— 5 36 2.3	— 0 27 50.2
New Haven . . .	+41 18 36.5	— 11 24.6	9.999370	— 0 16 29.90	+ 4 51 42.19
New York ( <i>Columb. Coll.</i> )	+40 45 23.1	— 11 22.7	9.999384	— 0 12 18.40	+ 4 55 53.69
New York ( <i>RUTHERFORD</i> )	+40 43 48.5	— 11 22.6	9.999384	— 0 12 15.47	+ 4 55 56.62

## POSITIONS OF OBSERVATORIES.

(North Latitudes and West Longitudes are Considered Positive.)

Place.	Latitude.	Reduction to Geocentric Latitude.	Log $\rho$ .	Longitude	
				From Washington.	From Greenwich.
				<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Nice . . . . .	+ 43° 43' 16.7"	-11' 29.8"	9.999309	- 5 37 24.29	- 0 29 12.20
Nicolaëff . . . .	+ 46 58 20.6	-11 29.2	9.999226	- 7 16 6.2	- 2 7 54.1
Odessa . . . . .	+ 46 28 36	-11 29.8	9.999239	- 7 11 14.4	- 2 3 2.3
Ogden . . . . .	+ 41 13 8.6	-11 24.3	9.999372	+ 2 19 47.52	+ 7 27 59.61
Ó-Gyalla . . . . .	+ 47 52 43.4	-11 27.4	9.999204	- 6 20 57.68	- 1 12 45.59
Olmütz . . . . .	+ 49 35 43	-11 22.1	9.999160	- 6 17 14.7	- 1 9 2.6
Oxford ( <i>Radcliffe</i> ) . .	+ 51 45 36.0	-11 12.0	9.999106	- 5 3 9.5	+ 0 5 2.6
Oxford ( <i>University</i> ) . .	+ 51 45 34.2	-11 12.0	9.999106	- 5 3 11.69	+ 0 5 0.40
Padua . . . . .	+ 45 24 2.5	-11 30.6	9.999266	- 5 55 41.22	- 0 47 29.13
Palermo . . . . .	+ 38 6 44	-11 10.2	9.999449	- 6 1 37.1	- 0 53 25.0
Paramatta . . . . .	- 33 48 49.8	+10 37.8	9.999553	-15 12 18.3	-10 4 6.2
Paris . . . . .	+ 48 50 11.8	-11 24.8	9.999179	- 5 17 33.11	- 0 9 21.02
Philadelphia . . . .	+ 39 57 7.5	-11 19.5	9.999404	- 0 7 33.64	+ 5 0 38.45
Pola . . . . .	+ 44 51 49.0	-11 30.6	9.999280	- 6 3 35.27	- 0 55 23.18
Potsdam . . . . .	+ 52 22 56	-11 8.4	9.999091	- 6 0 29	- 0 52 17
Poughkeepsie . . . .	+ 41 41 18	-11 25.8	9.999360	- 0 12 38.5	+ 4 55 33.6
Prague . . . . .	+ 50 5 18.8	-11 20.2	9.999148	- 6 5 53.5	- 0 57 41.4
Princeton . . . . .	+ 40 20 57.8	-11 21.2	9.999394	- 0 9 34.54	+ 4 58 37.55
Pulkowa . . . . .	+ 59 46 18.7	-10 1.8	9.998917	- 7 9 30.76	- 2 1 18.67
Quebec . . . . .	+ 46 48 17.3	-11 29.4	9.999231	- 0 23 22.8	+ 4 44 49.3
Rio de Janeiro . . . .	- 22 54 23.8	+ 8 14.0	9.999782	- 2 15 30.68	+ 2 52 41.41
Rochester . . . . .	+ 43 8 15	-11 29.0	9.999324	+ 0 3 8	+ 5 11 20
Rome ( <i>Coll. Rom.</i> ) . .	+ 41 53 53.7	-11 26.3	9.999355	- 5 58 6.79	- 0 49 54.70
Saint Petersburg . . .	+ 59 56 29.7	- 9 59.8	9.998913	- 7 9 25.6	- 2 1 13.5
San Fernando . . . .	+ 36 27 41.5	-10 59.5	9.999490	- 4 43 22.5	+ 0 24 49.6
Santiago de Chile . . .	- 33 26 42.0	+10 34.4	9.999561	- 0 25 29.7	+ 4 42 42.4
Schwerin . . . . .	+ 53 37 38.2	-11 0.2	9.999061	- 5 53 52.8	- 0 45 40.7
Senftenberg . . . . .	+ 50 5 10.1	-11 20.2	9.999148	- 6 14 2.7	- 1 5 50.6
Speier . . . . .	+ 49 18 55.4	-11 23.2	9.999167	- 5 41 57.7	- 0 33 45.6
Stockholm . . . . .	+ 59 20 33.0	-10 6.9	9.998927	- 6 20 26.09	- 1 12 14.00
Stonyhurst . . . . .	+ 53 50 40	-10 58.7	9.999055	- 4 58 19.41	+ 0 9 52.68
Strassburg ( <i>New Obs.</i> ) .	+ 48 34 59.7	-11 25.5	9.999186	- 5 39 16.74	- 0 31 4.65
Strassburg ( <i>Old Obs.</i> ) .	+ 48 34 53.8	-11 25.5	9.999186	- 5 39 14.58	- 0 31 2.49
Sydney . . . . .	- 33 51 41.1	+10 38.3	9.999552	-15 13 2.7	-10 4 49.6
Taschkent . . . . .	+ 41 19 32.2	-11 24.7	9.999369	- 9 45 22.89	- 4 37 10.80
Toulouse . . . . .	+ 43 36 47	-11 29.7	9.999312	- 5 14 3.2	- 0 5 51.1
Turin . . . . .	+ 45 4 6.0	-11 30.7	9.999275	- 5 39 0.5	- 0 30 48.4
Twickenham . . . . .	+ 51 27 4.2	-11 13.7	9.999114	- 5 6 59.0	+ 0 1 13.1
Univ. of Virginia . . .	+ 38 2 1.2	-11 9.8	9.999448	+ 0 5 53.13	+ 5 14 5.22
Upsala . . . . .	+ 59 51 31.5	-10 0.8	9.998915	- 6 18 42.28	- 1 10 30.19
Utrecht . . . . .	+ 52 5 10.5	-11 10.2	9.999098	- 5 28 43.8	- 0 20 31.7
Venice . . . . .	+ 45 25 49.5	-11 30.6	9.999266	- 5 57 37.5	- 0 49 25.4
Vienna ( <i>Josephstadt</i> ) . .	+ 48 12 53.8	-11 26.6	9.999195	- 6 13 37.4	- 1 5 25.3
Vienna ( <i>New Obs.</i> ) . .	+ 48 13 55.4	-11 26.5	9.999195	- 6 13 33.31	- 1 5 21.22
Vienna ( <i>Old Obs.</i> ) . .	+ 48 12 35.5	-11 26.6	9.999195	- 6 13 43.83	- 1 5 31.74
Warsaw . . . . .	+ 52 13 5.7	-11 9.4	9.999095	- 6 32 19.5	- 1 24 7.4
Washington . . . . .	+ 38 53 38.8	-11 14.5	9.999430	0 0 0	+ 5 8 12.09

## POSITIONS OF OBSERVATORIES.

*(North Latitudes and West Longitudes are Considered Positive.)*

Place.	Latitude.	Reduction to Geocentric Latitude.	Log $\rho$ .	Longitude	
				From Washington.	From Greenwich.
West Point . . .	+ 41° 23' 31"	- 11' 24.9"	9.999368	- 0 12 22.71	+ 4 55 49.38
Wilhelmshaven . .	+ 53 31 52.0	- 11 0.9	9.999063	- 5 40 47.30	- 0 32 35.21
Williamstown ( <i>Mass.</i> )	+ 42 42 49	- 11 28.3	9.999334	- 0 15 18.6	+ 4 52 53.5
Williamstown ( <i>Victoria</i> )	- 37 52 7.2	+ 11 8.8	9.999455	- 14 47 50.9	- 9 39 38.8
Wilna . . . . .	+ 54 41 0	- 10 52.3	9.999035	- 6 49 24.0	- 1 41 11.9
Windsor . . . . .	- 33 36 28.9	+ 10 35.9	9.999558	- 15 11 33.8	- 10 3 20.77
Zürich . . . . .	+ 47 22 40.0	- 11 28.5	9.999216	- 5 42 24.7	- 0 34 12.6



# ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

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## PART I—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

THE greater portion of this Ephemeris, embracing the positions of the sun and moon; the distances of the moon from the centres of the sun and the four most conspicuous planets, and from certain fixed stars; the ephemerides of the planets Mercury, Venus, Mars, Jupiter, and Saturn, is designed for the special use of navigators. The remainder contains the ephemeris of Uranus and Neptune, the heliocentric co-ordinates of the seven major planets, the rectangular equatorial co-ordinates of the sun, the moon's longitude and latitude, data for the libration of the moon, the obliquity of the ecliptic, the equation of the equinoxes, etc.

### TIME.

Astronomers make use of several different kinds of time: mean solar time; true, or apparent solar time, and sidereal time.

*Solar Time.*—Solar time is that used for all the purposes of ordinary life, and is measured by the daily motion of the sun. A *Solar Day* is the interval of time between two successive transits of the sun over the same meridian; and the hour-angle of the sun is called *Solar Time*. This is the most natural and direct measure of time. But the intervals between the successive returns of the sun to the same meridian are not exactly equal, owing to the varying motion of the earth around the sun, and to the obliquity of the ecliptic. The intervals between the sun's transits over the meridian being unequal, it is impossible to regulate a clock or chronometer so that it shall accurately follow the sun.

To avoid the irregularity which would arise from using the true sun as the measure of time, a fictitious sun, called the *Mean Sun*, is supposed to move in the equator with a uniform velocity. This mean sun is supposed to keep, on the average, as near the real sun as is consistent with perfect uniformity of motion; it is sometimes in advance of it, and sometimes behind it, the greatest deviation being about 16 minutes of time.

*Mean Solar Time*, which is perfectly equable in its increase, is measured by the motion of this mean sun. The clocks in ordinary use and the chronometers used by navigators are regulated to mean solar time.

*True, or Apparent Solar Time* is measured by the motion of the real sun.

The difference between apparent and mean time is called the *Equation of Time*. By means of it, we change apparent to mean time, or the reverse. Thus, if the apparent time be given, the mean time corresponding to it will be obtained by adding or subtracting the equation of time, according to the precept at the head of the column in which it is found, on page I of the Calendar for each month. If the mean time be given, the apparent time is obtained by applying the equation of time as directed by the precept on page II of the Calendar.

*Sidereal Time.*—Sidereal time is measured by the daily motion of the stars; or, as it is used by astronomers, by the daily motion of that point in the equator from which the true right ascension of the stars is counted. This point is the vernal equinox, and its hour-angle is called *Sidereal Time*. Astronomical clocks, regulated to sidereal time, are called sidereal clocks.



A *Sidereal Day* is the interval of time between the transit of the vernal equinox over any meridian, and its next succeeding return to the same meridian. It is about  $3^m 56^s$  shorter than the mean solar day;  $365\frac{1}{4}$  solar days, or a year, being divided into  $366\frac{1}{4}$  sidereal days. It is divided into 24 hours. The sidereal hours are counted from 0 to 24, commencing with the instant of the passage of the true vernal equinox over the upper meridian, and ending with its return to the same meridian. About March 21st of each year the sidereal clock agrees with the mean time, or ordinary clock, and the former gains on the latter about  $3^m 56^s$  per day, so that at the end of a year it will have gained an entire day, and will again agree with the mean time clock.

*Day.*—The *Civil Day*, according to the customs of society, commences at midnight, and comprises twenty-four hours from one midnight to the next following. The hours are counted from 0 to 12 from midnight to noon, after which they are again reckoned from 0 to 12 from noon to midnight. Thus the day is divided into two periods of 12 hours each, of which the first is marked A. M., and the last is marked P. M.

The *Astronomical Day* commences at noon on the civil day of the same date. It also comprises twenty-four hours, but they are reckoned from 0 to 24, and from the noon of one day to that of the next following. The astronomical as well as the civil time may be either apparent or mean, according as it is reckoned from apparent noon or from mean noon.

The civil day begins twelve hours before the astronomical day; therefore the first period of the civil day answers to the last part of the preceding astronomical day, and the last period of the civil day corresponds to the first part of the same astronomical day. Thus, January 9th, 2 o'clock, A. M., civil time, is January 8th, 14<sup>h</sup>, astronomical time; and January 9th, 2 o'clock, P. M., civil time, is also January 9th, 2<sup>h</sup>, astronomical time. The rule, then, for the transformation of civil time into astronomical time is this:—*If the civil time is marked A. M., take one from the day and add twelve to the hours, and the result is the astronomical time wanted; if the civil time is marked P. M., take away the designation P. M., and the astronomical time is had without further change.*

*To change astronomical to civil time, we simply write P. M. after it, if it is less than 12 hours. If greater than 12 hours, we subtract 12 hours from it, add 1 to the days, and write A. M.* For example, January 3d, 23 hours, astronomical time, is January 4th, 11 o'clock, A. M. civil time.

If the longitude from Greenwich be expressed in time, and, when *west*, added to the local time, or, when *east*, subtracted from the local time, the result is the corresponding Greenwich time. If the local mean time is used, the result is the Greenwich mean time, which ordinarily is that required for the use of this Ephemeris. The rule is the same, whether we use mean or sidereal time.

#### THE CALENDAR.

The Calendar is divided into twelve months, and to each month are assigned eighteen pages, the contents of which are as follow:—

Page I contains, for Greenwich apparent noon of each day, *The Sun's Apparent Right Ascension and Declination*, and the *Equation of Time*. Adjoining columns contain the differences of these quantities for one hour. By multiplying this difference by the hours and parts of an hour from Greenwich apparent noon, and adding the amount to, or subtracting it from, the quantity at noon, according as that quantity is increasing or decreasing, we obtain the value of any quantity for any given Greenwich apparent time. The hourly differences are given for the instant of apparent noon at Greenwich, and, when greater accuracy is required, should be first interpolated for half the hours and parts of an hour of the Greenwich apparent time.

This page is chiefly used when the sun is observed on the meridian, and the local apparent time is 0<sup>h</sup> 0<sup>m</sup> 0<sup>s</sup>. The longitude from Greenwich expressed in time, if *west*, is at that instant the Greenwich apparent time, or time after Greenwich apparent noon; if *east*, it is time before

Greenwich apparent noon. The longitude of any place is therefore employed in reducing the quantities on this page to apparent noon at the place.

The right ascension of the sun thus reduced is the sidereal time of local apparent noon. The difference between it and the clock time of the meridian passage of the sun is the error of the clock on sidereal time.

The declination of the sun reduced to the meridian, or apparent noon, of the place, is required in finding the latitude from a meridian altitude of the sun.

As an example of the use of page I:—

Let the sun's declination be required at apparent noon, 1888, May 30, at a place whose longitude is  $180^{\circ} 20'$ , or  $12^{\text{h}} 1^{\text{m}} 20^{\text{s}}$  west from Greenwich.

Local apparent time . . . . .	May 30,	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>
Longitude from Greenwich (additive) . . . . .		12	1	20
Greenwich apparent time . . . . .	May 30,	12	1	20

Reducing the minutes and seconds to decimals of an hour, we find that this moment is  $12^{\text{h}}.022$  after Greenwich apparent noon on May 30, or  $11^{\text{h}}.978$  before Greenwich apparent noon on May 31.

On page 74 of the Ephemeris we find that the change of declination in one hour is

May 30, at Greenwich apparent noon . . . . .	21.63
May 31, at Greenwich apparent noon . . . . .	20.68
Difference for one day . . . . .	0.95

If we want to be very exact, we find the amount of this hourly difference for the time which is half way between Greenwich noon and the time of observation; that is, for 6 hours after Greenwich noon of the 30th, this being half of 12 hours. Six hours is 0.25 of a day; so the calculation is as follow:—

Difference for one hour, May 30 . . . . .	21.63
Change for one day (or $0''.95$ ) $\times 0.25$ . . . . .	0.24
Difference at 6 hours after noon . . . . .	21.39
$21''.39 \times 12.022 = 257''.1 = 4' 17''.1$	

Declination at Greenwich noon, May 30 . . . . .	N. $21^{\circ} 52' 41.1''$
Change in $12.022$ hours (additive) . . . . .	4 17.1
Sun's declination at time of observation . . . . .	N. $21^{\circ} 56' 58.2''$

When the time of observation is only a few hours before Greenwich noon, it may be better to count the longitude backward from this nearest noon. Thus, in the example just given, the time is  $11^{\text{h}}.978$  before Greenwich noon of May 31; half this interval is about 0.25 of a day, and the hourly motion for the middle of the interval is  $20''.93$ . Then, we find:—

Declination at Greenwich noon, May 31 . . . . .	N. $22^{\circ} 1' 9''.0$
Product of $20''.93 \times 11.978 = 250''.8$ (subtractive) . . . . .	4 10.8
Sun's declination at time of observation . . . . .	N. $21^{\circ} 56' 58.2''$

It will always be well to make the calculation by both methods, as their agreement will show both to be right.

At sea it is ordinarily sufficient to have the declination to the nearest half minute, and the reduction may be found by Table V of Bowditch's *American Practical Navigator*.

The equation of time, as has been before explained, is the number of minutes and seconds to be added to or subtracted from the apparent time, or the time given by an observation of the sun, to obtain the mean time. The heading of the column directs the manner in which the equation is to be applied. When there is a change in the course of the month from addition to subtraction or the reverse (as in the months of April and June), the two different directions are separated by a line, while a corresponding line below points out the dates between which the change takes place. The equation of time, as given on page I, is the mean time of apparent noon, or the hour-angle of the mean sun at that instant.

*The Sun's Semidiameter* and the *Sidereal Time of Semidiameter Passing Meridian* are also given on page I. The sun's semidiameter is used in reducing the altitude of the upper or lower limb of the sun to the altitude of the centre; and in reducing the angular distance of the limb from the moon or some other object, to the distance from the centre of the sun. The sidereal time of semidiameter passing the meridian is employed in obtaining the passage of the sun's centre over the wires of a transit-instrument, when the passage of one limb only has been observed. The quantity found in this column is to be added to the time of transit of the first, or western, limb; and to be subtracted from the time of transit of the second, or eastern, limb.

Page II contains, for Greenwich mean noon of each day, *The Sun's Apparent Right Ascension*, and *Declination*, the *Equation of Time* and the *Sidereal Time of Mean Noon*. The hourly changes of these quantities are also given, and may be used in reducing them to any Greenwich mean time. The hourly changes may be first interpolated for half the Greenwich time, when great precision is required, in the way described in explaining the calculation of the declination.

The right ascension and declination on pages I and II are affected by aberration, and therefore denote the *apparent* position of the *true* sun. Page II is more conveniently used when the mean time is known. This is the case in most observations of the sun out of the meridian, when the times have been noted by a clock or chronometer regulated to mean time. The quantities on this page can be reduced to mean noon of any place by interpolating for the longitude, as in the example of the sun's declination on the preceding page.

The sun's declination is required for finding the latitude of the place, the local time, and the sun's azimuth and amplitude, from observations of the sun.

The equation of time is needed in finding the mean time from observations of the sun, and the latitude from observations out of the meridian. The heading of the column directs the manner in which it is to be applied to mean time to obtain the apparent time.

The equation of time, as given on page II, is the apparent time of mean noon; and is equivalent to the hour-angle of the true sun at the instant of mean noon.

The sidereal time of mean noon is also the right ascension of the mean sun at Greenwich mean noon. It may be reduced for the longitude, or to any Greenwich mean time, by using the hourly difference,  $9^{\text{s}}.8565$ ; or by Table III, appended to this volume, for reducing intervals of mean solar to sidereal time. Table LI of Bowditch's *Navigator* may be used for the same purpose when only the nearest quarter of a second is required.

The sun's right ascension and the sidereal time of mean noon, or right ascension of the mean sun, are useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the R. A. of the mean sun for this time, as last explained: this being added to the local mean time will give the sidereal time.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time, gives the interval of sidereal time from noon. Subtracting from this the corresponding reduction of a sidereal interval to a mean time interval, in Table II, appended to this volume, or Table LII of Bowditch's *Navigator*, will give the mean time required. This reduction may also be found by multiplying  $9^{\text{s}}.8296$  by the hours and parts of an hour of the given sidereal time.

As examples of the use of page II:—

1.—Let the sun's right ascension and the equation of time be required for 1888, May 15,  $9^{\text{h}} 2^{\text{m}} 30^{\text{s}}$ , A. M., mean time, at a place whose longitude is  $100^{\circ} 10'$ , or  $6^{\text{h}} 40^{\text{m}} 40^{\text{s}}$ , west of Greenwich.

Local astronomical mean time	.	.	.	May 14,	$\begin{smallmatrix} \text{h} & \text{m} & \text{s} \\ 21 & 2 & 30 \end{smallmatrix}$
Longitude from Greenwich (additive)	.	.	.		$\begin{smallmatrix} 6 & 40 & 40 \end{smallmatrix}$
Greenwich mean time.	.	.	.	May 15,	$\begin{smallmatrix} 3 & 43 & 10 = 3^{\text{h}}.7194 \end{smallmatrix}$

Sun's Right Ascension			Equation of Time.		
May 15, Greenwich noon	<sup>h</sup> 3 <sup>m</sup> 30 <sup>s</sup> 44.44		May 15, noon	<sup>m</sup> 3 <sup>s</sup> 49.79 (additive).	
H. D. $9^{\circ}.890 \times 3.7194$	$+ 0 \ 36.78$		H. D. $-0^{\circ}.034 \times 3.72$	$- 0.13$	
	<u>3 31 21.22</u>			<u>3 49.66</u>	

In this case, the hourly differences interpolated to half the interval, or 1<sup>h</sup>.9 after noon, have been used.

The equation of time in this example is additive to mean time. Its reduction could also have been found by Table VI, A., of Bowditch's *Navigator*, but to seconds only.

2.—If the sidereal time is required for the same date and time, we have:—

May 15, Sidereal Time (at Greenwich mean noon)	<sup>h</sup> 3 <sup>m</sup> 34 <sup>s</sup> 23
Hourly Difference $9^{\circ}.8565 \times 3.7194$	$+ 0 \ 36.66$
Add the local astronomical mean time	21 2 30.00
The required sidereal time is (rejecting 24 <sup>h</sup> )	<u>0 37 40.89</u>

The reduction 0<sup>m</sup> 36<sup>s</sup>.66 could have been found in Table III corresponding to the Greenwich mean time 3<sup>h</sup> 43<sup>m</sup> 10<sup>s</sup>. Also, by Table LI of Bowditch's *Navigator*, the reduction is 0<sup>m</sup> 36<sup>s</sup>.7.

3.—On 1888, May 15, A. M., at a place whose longitude is 100° 10' W., suppose the sidereal time to be 0<sup>h</sup> 36<sup>m</sup> 37<sup>s</sup>.16, and that the corresponding mean time is required.

The astronomical day is May 14; the longitude in time,  $+ 6^{\text{h}} 40^{\text{m}} 40^{\text{s}}$ , or  $+ 6^{\text{h}}.678$ .

May 14, Sidereal Time (at Greenwich mean noon)	<sup>h</sup> 3 <sup>m</sup> 30 <sup>s</sup> 37.68
The H. D. $9^{\circ}.8565 \times 6.678$ , or the reduction for 6 <sup>h</sup> 40 <sup>m</sup> 40 <sup>s</sup> in Table III	$+ 1 \ 5.82$
The sidereal time of local mean noon	<u>3 31 43.50</u>
The given sidereal time ( $+ 24^{\text{h}}$ , if necessary for the following subtraction)	24 36 37.16
Subtracting the first from the second gives the sidereal interval from noon	<u>21 4 53.66 = 21<sup>h</sup>.08157</u>
$- 9^{\circ}.8296 \times 21.08157$ , or the reduction for 21 <sup>h</sup> 4 <sup>m</sup> 53 <sup>s</sup> .66 in Table II	$- 3 \ 27.22$
The required astronomical mean time is	May 14, <u>21 1 26.44</u>

Page III contains, for Greenwich mean noon of each day, *The Sun's True Longitude and Latitude*, and the *Logarithm of the Radius Vector of the Earth*. The longitudes of the sun are the true longitudes, not corrected for aberration. The longitude is given in two columns, headed  $\lambda$  and  $\lambda'$ ;  $\lambda$  representing the sun's longitude counted from the true equinox of the date; and  $\lambda'$ , the same co-ordinate counted from the mean equinox of the beginning of the year, (January 0<sup>d</sup>.0). A column of hourly differences enables the computer to obtain the sun's longitude for any hour from noon. The hourly differences of the logarithm of the radius vector are likewise given. The latitude is referred to the ecliptic of the date.

The last column on page III contains the *Mean Time of Sidereal Noon*; that is, the number of hours, minutes and seconds after Greenwich mean noon when the first point of Aries passes the meridian of Greenwich. It may be reduced to any meridian by interpolating for the longitude, or to any Greenwich sidereal time by means of the hourly difference,  $- 9^{\circ}.8296$ . The reduction, however, can be taken directly from Table II for reducing intervals of sidereal time to mean solar time; or, approximately, from Table LII Bowditch's *Navigator*.

This column may be used in converting sidereal time to mean time instead of that on page II. As an illustration, let us take Example 3, above.

It is seen in advance that the sum of the mean time of sidereal noon and the given sidereal time is less than 24 hours. Were it more than 24 hours, the mean time of sidereal noon should be taken out for May 13, that is the preceding astronomical day.

May 14, the mean time of Greenwich sidereal noon is	<sup>h</sup> 20 <sup>m</sup> 26 <sup>s</sup> 0.91
The H. D. $- 9^{\circ}.8296 \times 6.678$ , or the reduction for long., Table II	$- 1 \ 5.64$
The mean time of local sidereal noon	<u>20 24 55.27</u>
Add the given sidereal time	<u>0 36 37.16 = 0<sup>h</sup>.6103</u>
The sum is	<u>21 1 32.43</u>
$- 9^{\circ}.8296 \times 0.6103$ , or the reduction for 0 <sup>h</sup> 36 <sup>m</sup> 37 <sup>s</sup> .2 in Table II	$- 0 \ 6.00$
The required astronomical mean time	May 14, <u>21 1 26.43</u>

Page IV contains *The Moon's Semidiameter* and *Equatorial Horizontal Parallax*, for each mean noon and midnight at Greenwich. Columns adjoining those of the horizontal parallax give the change of this quantity in one hour, by means of which it can be reduced to any other Greenwich mean time, in the same way as the sun's declination and the equation of time in the preceding examples. The sign plus or minus prefixed to the hourly differences, shows whether the horizontal parallax is increasing or decreasing.

The reduction of the moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.272. It may also be obtained from Table XI of BOWDITCH'S *Navigator*, or by simply computing the proportional part.

If, for example, the semidiameter of the moon is to be taken out for 1888, Jan. 21, 10<sup>h</sup>, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of Jan. 21 is 1".1; then,

$$\text{as } 12^h : 10^h = 1''.1 : 0''.91,$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The moon's semidiameter then, for Jan. 21, 10<sup>h</sup>, is 14' 48".5 + 0".91, or 14' 49".4.

The moon's semidiameter and horizontal parallax are required for all observations of the moon. When great precision is needed, the hourly differences should be first interpolated for half the interval of Greenwich time from noon or midnight, and a correction applied to the horizontal parallax for the latitude of the place of observation.

The *Mean Time of the Moon's Upper Transit at Greenwich*, which is given on page IV to tenths of a minute, is also accompanied with a column of differences for one hour of longitude, by means of which, having the longitude converted into time, the local time of the moon's meridian passage at any other place, may be computed. The reduction may be taken by simple inspection from BOWDITCH'S Table XXVIII. The last column of this page contains the *Age* of the moon, or the time elapsed since the preceding new moon, to tenths of a day.

Pages V—XII contain *The Moon's Right Ascension*, and *Declination*, for each day and hour of Greenwich mean time. They are accompanied with columns of differences for one minute, which are also given at each hour. The Greenwich mean time, which is required for taking out these quantities, may be taken from a well-regulated chronometer, or obtained by applying the longitude converted into time, to the local mean time of the observer. The right ascension or declination is taken out for the day and hour of the Greenwich mean time; the *Diff. for 1 Minute* multiplied by the minutes and parts of a minute of the Greenwich time, and the product added to, or subtracted from the quantity, according as the quantity is increasing or decreasing.

Thus, suppose the moon's right ascension and declination are required for 1888, Sept. 9, 10<sup>h</sup> 10<sup>m</sup> 30<sup>s</sup>, astronomical mean time at Greenwich:—

	Right Ascension.			Declination.		
	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>		<sup>°</sup>	<sup>'</sup> <sup>"</sup>
Sept. 9, 10 <sup>h</sup> . . . . .	14	27	24.22	S.	9	14' 1".0
Diff. 2".3068 × 10.5 . . . . .	= + 24.22			12".012 × 10.5 =	+ 2 6.1	
Sept. 9, 10 <sup>h</sup> 10 <sup>m</sup> 30 <sup>s</sup> . . . . .	14	27	48.44	S.	9	16 7.1

The differences interpolated for 5<sup>m</sup>.2 = 0<sup>h</sup>.09 are, for the right ascension 2".3072, and for the declination 12".002, which may be used for greater precision.

Page XII contains also the *Phases of the Moon* and the dates of the *Moon's Perigee and Apogee*, or least and greatest distances from the earth.

Pages XIII—XVIII contain the *Lunar Distances*, or the angular distances of the centre of the moon from the centre of the sun, and from the four larger planets and certain fixed stars, as they would appear to an observer at the centre of the earth. They are given for every third hour of Greenwich mean time, beginning at noon; the dates are therefore astronomical. All the distances that can be observed on the same day, are grouped together under that date; and the columns are read from left to right, across both pages of the same opening. The letter W. or E. is affixed to the name of the sun, planet or star, to indicate that it is on the west, or east side of the moon.

An observer on the earth's surface having measured a lunar distance, corrected it for errors of his instrument and for the semidiameter of the objects, and cleared it from the effects of refraction and parallax, finds the true or geocentric distance, that is, the distance as it would have appeared from the centre of the earth at the moment of observation. With this distance and the distances in the Ephemeris of the same bodies on the same day, the Greenwich mean time of the observation can be found.

To lessen the labor of computation, there is given in the Ephemeris, between every two successive distances, the logarithm of the seconds of time in which the distance changes  $1''$ ; or, as it is usually called, the *Proportional Logarithm of the Difference*. It is given for the middle instant of the two hours between which it is placed.

For computing the Greenwich time we have the following rule:—

*Find in the Almanac the two distances between which the true distance falls; take out the nearer of these, the hours of Greenwich time over it, and the P. L. of Diff. between them.*

*Find the difference between the true distance and the distance taken from the Almanac; and from the proportional logarithm of this difference, as found in the Navigator, subtract the P. L. of Diff. taken from the Almanac.*

*The result is the proportional logarithm of an interval of time to be added to the hours of Greenwich time, taken from the Almanac, when the earlier Almanac-distance is used; to be subtracted from the hours of Greenwich time, when the later Almanac-distance is used.*

Another method is, to add the common logarithm of the difference of the true and the Almanac-distances to the P. L. of Diff. of the Almanac; the sum will be the common logarithm of the correction to be applied to the hours of Greenwich time. The Table of *Logarithms of small Arcs in Space or Time*, given at the end of the volume for 1871, saves the operation of reducing degrees (or hours) and minutes to seconds, and the reverse.

As the P. L. of Diff. in the Ephemeris varies, the Greenwich time found by the methods just described may not be sufficiently exact. To correct it for such variation, or second difference, take the difference between the P. L. of Diff. used and the one which follows it in the Ephemeris, (or, more strictly, half the difference of the preceding and following ones). With this difference, and the first correction of the Greenwich time already found, enter Table I, appended to this volume, and take out the corresponding seconds, which are to be added to the approximate Greenwich time when the Prop. Logs. in the Ephemeris are decreasing; and subtracted when they are increasing.

Thus the Greenwich mean time of the observation can be obtained. If the observer has noted the time of observation by a chronometer, the difference of this chronometer-time and the Greenwich mean time will be the error of the chronometer on Greenwich time as found from the lunar distance. In this way lunar distances can be used as a check upon the chronometer. By a series of carefully observed lunar distances on both sides of the moon, the chronometer-error may generally be ascertained within 20 or 30 seconds.

If the observer has found the local mean time of observation from the observed altitude of one of the bodies, or by a watch regulated to that time by recent observations and corrected for change of longitude in the interval, the difference of this local time and the Greenwich time found from the lunar distance will be his longitude. A longitude derived by this method should always be considered as uncertain by  $5'$  or more.

As an example of finding the Greenwich mean time from a lunar distance, suppose that in 1888, June 5, the corrected distance of the moon's centre from that of  $\alpha$  Pegasi is  $46^\circ 12'$ :—

Corrected distance	.	.	.	.	.	46° 12' 0"	
Distance in Ephemeris June 5, VI <sup>h</sup>	.	.	.	.	.	46 34 52	P. L. 0.3829
Difference	.	.	.	.	.	0 22 52	P. L. 0.8961
							P. L. 0.5132
Time from VI <sup>h</sup> ( <i>before</i> )	.	.	.	.	.	— 0 55 13	
Corr. for 2d Diff., Table I	.	.	.	.	.	+ 9	
Greenwich mean time June 5	.	.	.	.	.	5 4 56	

By a table of common logarithms, or a table of logarithms of small areas, the reduction of the Greenwich time would be found thus:—

From Ephemeris . . . . .	P. L.	0.3829
Diff. of distances, $22' 52'' = 1372''$ . . . . .	log	3.1373
Red. of Greenwich time, $-0^h 55^m 13^s = -3313^s$ . . . . .	log	3.5202

The result is the same as by the previous method.

Pages 218—249 contain the geocentric ephemerides of the seven major planets. The positions are referred to the equator and true equinox of the date, and corrected for aberration; they are, therefore, apparent positions. All the data except meridian passage are given for the moment of Greenwich mean noon. The column *Meridian Passage* gives the hour, minute and tenth of that passage of the planet over the meridian of Greenwich which occurs next after the noon of the date.

The right ascension and declination of a planet are required whenever it has been observed for time, latitude or azimuth. The mode of reducing them to any instant of Greenwich mean time is the same as in the examples for the sun, previously given. The local mean time of passage across any other meridian can be found by dividing the daily differences by 24, and multiplying the quotient by the hours and fractions of the longitude of the place. The product is subtractive from the time of Greenwich passage when the place is east of Greenwich, and additive when west. The corrections can never exceed one-half the change for one day.

Pages 250—263 contain the heliocentric positions of the seven major planets, and the logarithms of their distances from the earth. The heliocentric longitude is reckoned, not from the true equinox, as in the preceding ephemerides, but from the mean equinox of the date. It is, therefore, necessary to apply nutation, if the longitude from the true equinox is required. The daily motion is given for the moment of Greenwich mean noon. The column *Reduction to Orbit* gives the correction to be applied to the heliocentric longitudes in order to obtain the longitude counted along the orbit of the planet. This longitude is equal to the distance of the node from the mean equinox, plus the distance of the planet from the node. The heliocentric latitude is counted from the moving plane of the ecliptic. The *Logarithm of Radius Vector* is the logarithm of the distance of the centre of the planet from that of the sun, at each Greenwich mean noon given in the first column. The last two columns give, in the same way, the logarithm of the true distance of the centre of the planet from that of the earth. The one column gives the quantity for the Greenwich noon indicated on the left hand side of the page, and the other for the noon which is midway between that date and the date next below it. In the case of Mercury, this intermediate date is mean noon of the day immediately following; in the case of Venus, Mars, Jupiter, and Saturn, it is mean noon of the second day following; and in the case of Uranus and Neptune, mean noon of the fourth day following.

Pages 264—271 contain the rectangular co-ordinates of the centre of the sun, referred to the centre of the earth as the origin, and to the true equator and equinox of each date as the circle and point of reference. Each co-ordinate is given first for Greenwich mean noon, and in the column following for mean midnight of the same day. The columns *Reduc. to Mean Eq'r of Jan. 0* give the corrections to be applied to the co-ordinates for noon in order to obtain the corresponding co-ordinates referred to the mean equator and the mean equinox of January 0.

Pages 272—275 give the longitude and latitude of the moon for every Greenwich mean noon and midnight. Both quantities are referred to the true ecliptic and equinox of the date.

Pages 276 and 277 contain the position of the moon's equator and the mean longitude of the moon, and a table for computing the libration of the moon. The epochs of greatest libration of the moon, together with the formulæ for finding the libration in longitude and latitude are given on page 418.

Page 278 contains, for each tenth Greenwich mean noon, the values of the principal elements arising from the motion of the equinox, and also the aberration and parallax of the sun. The column *Apparent Obliquity of the Ecliptic* (HANSEN) gives the true inclination of the earth's

equator to the ecliptic, without correction for the terms depending on the moon's longitude. The *Equation of Equinoxes* is really the astronomical nutation; that given *In Longitude* is the correction to be applied to the longitude of the body referred to the mean equinox, in order to obtain that longitude as referred to the true equinox. When the correction is positive, the true longitudes are greater than those referred to the mean equinox; while the contrary is true when the correction has the negative sign. The equation *In R. A.* is equal to that in longitude, multiplied by the cosine of the obliquity of the ecliptic.

The next column gives the *Precession of Equinoxes in Longitude*, from January 0 to each of the dates following. The *Sun's Aberration* is the quantity which is to be applied to the true longitude of the sun in order to obtain its apparent longitude. The correction being negative shows that the apparent longitude as affected by aberration is always less than the true longitude. The *Sun's Equatorial Horizontal Parallax*, given in the next column, is the angle subtended by the radius of the earth's equator, as seen from the centre of the sun.

## PART II—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Page 280 contains the formulæ for reducing the positions of the fixed stars, using the notation of BESSEL, and the constants of PETERS and STRUVE. The formulæ by which the star-numbers are computed are also given.

Pages 281—284 contain the logarithms of the *Besselian Star-Numbers*, *A*, *B*, *C*, *D*, for each Washington mean midnight. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at the dates for which the numbers are given. If used in accordance with the English and French notation, the pair of quantities *A* and *B* must be interchanged with the pair *C* and *D*; that is, *A* must be interchanged with *C*, and *B* with *D*. In the first column along with the solar day is given, for certain dates, the sidereal hour and tenth of midnight. The sidereal time for which any set of quantities is given can be found by interpolation from these numbers.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:—

### Computation of the apparent place of $\alpha$ Bootis for 1888, July 2, for the upper transit at Washington.

(Star-Catalogue)	$\log a$	0.4483	$\log b$	8.3041 n	$\log c$	8.7748 n	$\log d$	8.5813 n
(Page 283)	$\log A$	9.3331	$\log B$	0.7191	$\log C$	0.5712	$\log D$	1.3019 n
(Star-Catalogue)	$\log a'$	1.2276 n	$\log b'$	9.7319	$\log c'$	9.7714	$\log d'$	9.4547 n
	$\log Aa$	9.7814	$\log Bb$	9.0232 n	$\log Cc$	9.3460 n	$\log Dd$	9.8832
	$\log Aa'$	0.5607 n	$\log Bb'$	0.4510	$\log Cc'$	0.3426	$\log Dd'$	0.7566

<i>Mean Place</i> , 1888.0, (page 298)	$\alpha_0 = 14^{\text{h}} 10^{\text{m}} 33.184^{\text{s}}$	$\delta_0 = +19^{\circ} 45' 56.87''$
	$Aa = + 0.604$	$Aa' = - 3.64$
	$Bb = - 0.105$	$Bb' = + 2.82$
	$Cc = - 0.222$	$Cc' = + 2.20$
	$Dd = + 0.764$	$Dd' = + 5.71$
	$E = 0.000$	$\tau \mu' = - 1.00$
	$\tau \mu = + 0.040$	

<i>Apparent Place</i> , 1888, July 2,	$\alpha = 14^{\text{h}} 10^{\text{m}} 34.185^{\text{s}}$	$\delta = +19^{\circ} 46' 2.96''$
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Pages 285—292 contain the *Independent Star-Numbers*, which can be used for the same purpose. The column  $\tau$  gives the fraction of the year from the beginning of the fictitious year to each date. These quantities are connected with those of BESSEL by the relations given on page 280, where are also found the formulæ and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star-constants,  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $a'$ ,  $b'$ ,  $c'$ ,  $d'$ . The independent star-numbers are given in order that the apparent place of the star may be determined when it is not convenient to compute these numbers.



The following is an example of the reduction of a star to apparent place by the independent star-numbers:—

*Computation of the apparent place of  $\alpha$  Bootis for 1888, July 2, for the upper transit at Washington.*

$\alpha_0 = 14^{\text{h}} 10^{\text{m}}$		$\delta_0 = +19^{\circ} 45' 9''$
$G = 50^{\circ} 30'$		$G + \alpha_0 = 263^{\circ} 8'$
$H = 169 28$		$H + \alpha_0 = 22 6$
$\log \frac{1}{r}$ 8.8230	$\log \frac{1}{r}$ 8.8230	$\alpha_0 = 14^{\text{h}} 10^{\text{m}} 33.184$
$\log g$ 0.8318	$\log h$ 1.3092	$f = + 0.659$
$\log \sin (G + \alpha_0)$ 9.9969 <i>n</i>	$\log \sin (H + \alpha_0)$ 9.5755	$(g) = - 0.161$
$\log \tan \delta_0$ 9.5555	$\log \sec \delta_0$ 0.0264	$(h) = + 0.542$
$\log (g)$ 9.2072 <i>n</i>	$\log (h)$ 9.7341	$\tau \mu = - 0.040$
		<hr/>
		<i>Apparent Right Ascension</i> = 14 10 34.184
<hr/>		
$\log g$ 0.8318	$\log h$ 1.3092	$\delta_0 = + 19^{\circ} 45' 56''.87$
$\log \cos (G + \alpha_0)$ 9.0776 <i>n</i>	$\log \cos (H + \alpha_0)$ 9.9669	$(g') = - 0.81$
$\log (g')$ 9.9094 <i>n</i>	$\log \sin \delta_0$ 9.5292	$(h') = + 6.39$
	$\log (h')$ 0.8053	$(i) = + 1.52$
		$\tau \mu' = - 1.00$
		<hr/>
$\log i$ 0.2087		
$\log \cos \delta_0$ 9.9736		$+ 19 46 2.97$
$\log (i)$ 0.1823		

Pages 293—301 contain the mean places of three hundred and eighty-three stars, for the beginning of the fictitious year 1888, or the moment when the sun's mean longitude is  $280^{\circ}$ .

The annual variations are to be considered as the differential coefficients of each co-ordinate with respect to the time at the beginning of the year.

In order that the list of mean places of stars may serve the purpose of a working-catalogue for the convenient use of astronomers, the position of each of the northern circumpolar stars is given in duplicate, one position being for the upper and the other for the lower culmination. The positions for the lower culmination are marked S. P. In this case, the right ascensions are the sidereal times at which the star crosses the lower meridian; and, in order to have the expressions for the co-ordinates congruous in all cases, the declinations are counted from the equator through the north pole, and therefore exceed  $90^{\circ}$ . The time of observation and setting of the circle, in order to find a star on the meridian, are then obtained uniformly for all the stars.

Beginning with the volume of 1882, the number of stars has been greatly increased, in order to make the list more useful to field-astronomers. In order to show at a glance these additional stars, they are indicated in the list by an asterisk.

Pages 302—313 contain the apparent positions of the four north polar stars,  $\alpha$ ,  $\delta$  and  $\lambda$  Ursæ Minoris, and 51 Cephei, for every upper transit at Washington. They include the terms depending on the moon's longitude. The mean solar time of transit is given in the column *Mean Solar Date*, in order that each transit above and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26th is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 302, we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But, the lower transit following that of July 1st (page 308), does not take place until July 2.3. Hence, the lower transit of July 1st precedes the upper one of the same date. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column of *Mean Solar Date*.

Pages 314—364 contain, for every tenth upper transit at Washington, the apparent places of those stars of the preceding list which are not marked with an asterisk. The mean solar date in each left hand column gives the day and tenth of the transit; so that each intermediate transit

may be readily identified. Along with each co-ordinate is given, in small type, the change for ten days. This quantity is to be regarded as the differential coefficient corresponding to the dates for which the star-places are given.

Pages 365—376 contain the apparent right ascensions of all stars marked with an asterisk in the list of mean places. The apparent right ascension of each star is given only for that part of the year when it may readily be observed on the meridian. In the case of circumpolar stars, the right ascensions for lower, as well as upper, transit are given.

Pages 377—384 contain the apparent right ascension, declination, and semidiameter of the sun, and the sidereal time, all for Washington mean noon. Adjoining columns give the seconds of right ascension and of declination for apparent noon, that is, for the moment of transit of the sun's centre over the meridian of Washington. The hours and minutes of right ascension, and the degrees and minutes of declination are the same for both mean and apparent noon. In case they would have differed, the minute which would have been numerically larger is diminished by one, and the seconds increased by sixty, so that there is always a correspondence between the two numbers. The hourly motions in right ascension and declination are given for the moment of mean noon, but may be regarded as having the same values for apparent noon.

The *Equation of Time for Apparent Noon* is the correction to be applied to apparent time in order to obtain mean time. It is, therefore, mean time minus apparent time. Each number as given is the mean time of transit of the sun's centre over the meridian of Washington, counted from the nearest noon. The use of all the quantities is substantially the same as in the *Ephemeris for the Meridian of Greenwich*.

Pages 385—392 contain the right ascension, declination, semidiameter, and parallax of the moon, at the moment of transit over the meridian of Washington. The mean time given in the second column is that of transit of the moon's centre over this meridian. The differences for one hour of longitude are the amounts by which the local mean times of transit over a meridian one hour west of Washington exceed those given in the column *Mean Time of Transit*, supposing the rate of change to be uniform and equal to what it is at the moment of transit over the meridian of Washington. The next four columns need no especial explanation, except that the differences for one hour of longitude are computed as if the motion of the moon in right ascension were uniform. By means of them, the position of the moon can be computed with astronomical accuracy at the moment of transit over any meridian not exceeding one hour in longitude from that of Washington, by taking account of second differences. With greater longitudes of the place, the accuracy of the result obtained in this way will diminish. The columns of sidereal time of semidiameter passing meridian, etc., do not seem to need any explanation, except that they all refer to the moment of transit. The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When two opposite limbs are both so nearly full that they can be well observed, both are indicated; and the one which is deficient is printed in smaller type. When the illumination is so nearly equal that no choice can be made between them, both are printed in large type.

Pages 393—410 contain the geocentric apparent right ascensions and declinations of the seven major planets, and their semidiameters and horizontal parallaxes, for the moments of all those transits over the meridian of Washington which can be observed.

### PART III—PHENOMENA.

This portion of *The American Ephemeris and Nautical Almanac* gives the principal astronomical phenomena of the year, reduced to Washington mean time, except in the case of the eclipses and the data for the rings of Saturn, which are given in Greenwich mean time.

Pages 412—417 inclusive contain the elements necessary for computing the eclipses of the sun which occur during the year.



The quantities  $l$  and  $l'$  are the radii of the shadow-cones upon the fundamental plane,  $l$  corresponding to the penumbra, and  $l'$  to the umbra, or annulus. The notation is that of CHAUVENET'S *Spherical and Practical Astronomy*, in which  $l'$  is regarded as positive for an annular, and negative for a total eclipse.

The angles  $f$  and  $f'$ , the tangents of which are given, are the angles which the elements of the respective shadow-cones make with the axis of the shadow; or, they are the semi-angles of the two cones.

At the bottom of the table are given the logarithms of the change of  $x$ ,  $y$  and  $\mu$ , in one minute, in order to facilitate the interpolation to any required moment.

The method of computing the eclipse from the given elements is as follows: It is premised that the moments of beginning and ending are those at which the distance of the observer from the axis of the shadow or penumbra is equal to the radius of the latter at the point of observation. To find such distance and radius we compute—

(1) The co-ordinates,  $\xi$ ,  $\eta$  and  $\zeta$ , of the observer, at some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase, together with their variations for one minute.

(2) The co-ordinates  $x$  and  $y$  of the axis of the shadow at the same moment, which, with their variations for one minute, are taken from the tables of elements.

(3) Hence, the position and motion of the observer relative to the axis of the shadow.

(4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer.

(5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follow:—

(1) Find the geocentric co-ordinates of the station referred to the earth's equator, which are represented by  $\rho \cos \varphi'$  and  $\rho \sin \varphi'$ ,  $\rho$  being the distance from the centre of the earth, and  $\varphi'$  the geocentric latitude. These may be obtained from geodetic tables, or may be computed from the following table by the formulæ—

$$\rho \cos \varphi' = F \cos \varphi$$

$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$

$\varphi$  being, as usual, the geographic latitude.

Table for Computing the Geocentric Co-ordinates of a Place.

$\varphi$	Log F.	Log G.
0°	0.00000	0.00302
5	0.00001	0.00300
10	0.00005	0.00297
15	0.00010	0.00292
20	0.00018	0.00284
25	0.00027	0.00275
30	0.00038	0.00264
35	0.00050	0.00252
40	0.00062	0.00239
45	0.00075	0.00226
50	0.00088	0.00213
55	0.00101	0.00201
60	0.00113	0.00189
65	0.00124	0.00178
70	0.00133	0.00169
75	0.00141	0.00161
80	0.00146	0.00155
85	0.00150	0.00152
90	0.00151	0.00151

For the assumed Greenwich mean time of computation, take from the table of elements the values of  $\sin d$ ,  $\cos d$ , and  $\mu$ . Put:

$\lambda$ , the longitude west from Greenwich. The co-ordinates of the observer will then be:—

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (\mu - \lambda) \\ \eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda) \\ \zeta &= \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda)\end{aligned}$$

and their variations in one minute of mean time will be:—

$$\begin{aligned}\xi' &= [7.63992] \rho \cos \varphi' \cos (\mu - \lambda) \\ \eta' &= [7.63992] \rho \cos \varphi' \sin d \sin (\mu - \lambda) = [7.63992] \xi \sin d \\ \zeta' &\text{ is not wanted.}\end{aligned}$$

(2) The co-ordinates  $x$  and  $y$  of the axis of the shadow are taken from the tables of elements for the same assumed moment of Greenwich mean time, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. The variations for one minute we represent by  $x'$  and  $y'$ . Their logarithms are given at the foot of the tables.

(3) The distance  $m$  and position-angle  $M$  of the axis of the shadow relative to the observer, and the relative motions,  $n$  and  $N$ , are computed by the formulæ:—

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta'\end{aligned}$$

(4) The radius  $L$  of the shadow or penumbra at the distance  $\zeta$  from the fundamental plane is computed by the formula

$$L = l - \zeta \tan f$$

$l$  and  $f$  being found in the table of elements, and  $\zeta$  computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or end of the eclipse, we shall have—

$$m = L$$

But, as this condition can scarcely ever be fulfilled on a first trial, a correction  $\tau$  to the assumed time is computed thus: Find the angle  $\psi$  from the equation,

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values to this angle, of which one will be in the first and the other in the second quadrant when  $\sin \psi$  is positive, and one in the third and the other in the fourth when  $\sin \psi$  is negative. But, simplicity will be gained by taking only that value of  $\psi$  for which  $\cos \psi$  is positive. This value lies between the limits  $+90^\circ$  and  $-90^\circ$ . The correction  $\tau$  to the assumed time will be found in minutes, from—

$$\text{For beginning:} \quad \tau = - \frac{m \cos (M - N)}{n} - \frac{L \cos \psi}{n}$$

$$\text{For ending:} \quad \tau = - \frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

One such pair of values of  $\tau$  cannot, however, give the times of both beginning and ending with accuracy. To attain accuracy we must, in commencing the computation, assume two times, one as near as practicable to that of beginning, and another near that of ending. These approximate times may be derived from the chart of the eclipse. We shall thus have two pairs of values of  $\tau$ . The computation for the first assumed time will give a small and nearly correct value for the beginning of the eclipse, and a large value which, added to the assumed time, will give an inaccurate time of ending. The computation for the second assumed time will give a small and nearly correct value for the end, and a large negative and inaccurate one for the beginning. We shall thus deduce two times of beginning and two of ending, of each of which only one is to be considered approximately correct.

The more accurate times of beginning and ending may now be taken in place of the first assumed ones, and the computation may be repeated from the beginning, leading to a pair of values of  $\tau$ , which should be very small and accurate. Such a repetition of the computation will in general be advisable, to guard against accidental numerical errors. The following theorem will, however, enable us to obtain a second approximation to the true times of each phase without repeating the computation.

**THEOREM.**—*The error of each result is approximately proportional to the square of the correction  $\tau$ , multiplied by the sine of the sun's hour-angle,  $(\mu-\lambda)$ , for the middle of the interval between the time of computation and that of the phase.*

To apply this theorem we find the two values of  $\tau^2 \sin(\mu-\lambda)$  corresponding to the required phase. We then find the ratio of these quantities—which will commonly be a large number, and divide the difference of the results by this ratio. The quotient will be a correction to be applied to the more accurate result in such a way as to make it deviate yet more from the less accurate one. This correction should be positive in the local forenoon, and negative in the afternoon, and its value should never materially exceed  $0^m.001 \tau^2$ .

Unless the times chosen for computation are unusually in error, say ten minutes or more, the corrected results thus obtained will be theoretically correct within less than a second. But to guard against numerical errors it is better, after making this final correction, to repeat the computations so far as to obtain new values of  $m$  and  $L$  for the corrected times. If these two quantities agree within a unit of the fourth place of decimals, the times employed are generally correct within a second of time. If they differ too widely, farther corrections and recomputations may be made by the computer according to his own judgment.

It may be remarked that the uncertainty of the ephemerides is such that a prediction may be several seconds in error from this unavoidable cause alone.

**Position-angle of Point of Contact.**—The position-angle,  $P$ , of the point of contact, reckoned from the north point of the sun's limb toward the east, is found by the formula

$$\text{For beginning:} \quad P = N - \psi \pm 180^\circ$$

$$\text{For end:} \quad P = N + \psi$$

$\psi$  being assumed that, in each case, the value of  $\psi$  is taken between the limits  $\pm 90^\circ$ .

*Computation of the Solar Eclipse of 1888, February 11, for Sandy Point, Patagonia, whose position is*

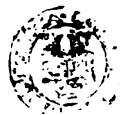
$$\text{Latitude, } \varphi = - 53^\circ 9'.5$$

$$\text{Longitude, } \lambda = + 70^\circ 53'.6$$

Constants for the given place:—

$$\rho \sin \varphi' = 9.90127 n$$

$$\rho \cos \varphi' = 9.77880$$



From the Eclipse Chart we find the approximate time of beginning to be  $11^h 30^m$  Greenwich mean time, and that the middle of the eclipse will take place about sunset. The computation of the time of beginning is as follows:—

Greenwich Mean Time,	February	Beginning.		
		h	m	s
	11	11	30	
$\mu$		168	52	48
$\mu - \lambda$		97	59	12
$\rho \cos \varphi'$		9.77880		
$\sin(\mu - \lambda)$		9.99577		
$\log \xi$		9.77457		
$\xi$		+ 0 59 507		

		Beginning.	
		h	m
Greenwich Mean Time,	February	11	11 30
	$\rho \sin \varphi'$	9.90127	<i>n</i>
	$\cos d$	9.98701	
		<hr/>	
		9.88828	<i>n</i>
	(1)	—	0.77320
	$\rho \cos \varphi'$	9.77880	
	$\sin d$	9.38189	<i>n</i>
	$\cos (\mu - \lambda)$	9.14284	<i>n</i>
		<hr/>	
		8.30253	
	(2)	+	0.02009
(1) — (2)	$\eta$	—	0.79329
	$\rho \sin \varphi'$	9.90127	<i>n</i>
	$\sin d$	9.38189	<i>n</i>
		<hr/>	
		9.28316	
	(3)	+	0.19194
	$\rho \cos \varphi'$	9.77880	
	$\cos d$	9.98701	
	$\cos (\mu - \lambda)$	9.14284	<i>n</i>
		<hr/>	
		8.90865	<i>n</i>
	(4)	—	0.08103
(3) + (4)	$\zeta$	+	0.11091
	const. log	7.63992	
	$\rho \cos \varphi' \cos (\mu - \lambda)$	8.92164	<i>n</i>
		<hr/>	
	log $\xi'$	6.56156	<i>n</i>
	$\xi'$	—	0.000364
	const. log	7.63992	
	log $\xi$	9.77457	
	$\sin d$	9.38189	<i>n</i>
		<hr/>	
	log $\eta'$	6.79638	<i>n</i>
	$\eta'$	—	0.000626
	$x - \xi$	—	0.37112
	$y - \eta$	—	0.45783
	$x' - \xi'$	+	0.008926
	$y' - \eta'$	+	0.002669
	$m \sin M$	9.56951	<i>n</i>
	$m \cos M$	9.66071	<i>n</i>
		<hr/>	
	$\tan M$	9.90880	
	$M$	219° 1' 40''	
	$\sin M$	9.79913	<i>n</i>
	log $m$	9.77038	

Greenwich Mean Time,	February	Beginning.	
		h	m
	11	11	30
$n \sin N$		7.95066	
$n \cos N$		7.42635	
$\tan N$		0.52431	
$N$		73° 21' 9"	
$\cos N$		9.45710	
$\log n$		7.96925	
$\log \frac{m}{n}$		1.80113	
$\tan f$ (Penumbra)		7.67544	
$\log \zeta$		9.04497	
		6.72041	
$\zeta \tan f$		0.000525	
$l$		0.561960	
$L$		0.561435	
$M - N$		145° 40' 31"	
$\sin (M - N)$		9.75119	
$\log m$		9.77038	
		9.52157	
$\log L$		9.74930	
$\sin \psi$		9.77227	
$\psi$		36° 17' 40"	
$\cos (M - N)$		9.91691	$n$
$\log \frac{m}{n}$		1.80113	
		1.71804	$n$
$-\frac{m}{n} \cos (M - N)$	+	52 <sup>m</sup> .244	
$\log L$		9.74930	
$\cos \psi$		9.90633	
$\csc n$		2.03075	
		1.68638	
$\frac{L \cos \psi}{n}$	$\mp$	48 <sup>m</sup> .571	
$\tau_1$	+	3 <sup>m</sup> .673	
$t$		11 <sup>h</sup> 30 <sup>m</sup>	
$T$		11 <sup>h</sup> 33 <sup>m</sup> .673	

No correction is necessary as the computed time differs very little from the assumed time. The local mean time of beginning is therefore February 11, 6<sup>h</sup> 50<sup>m</sup> 6<sup>s</sup>.

Angle of position:

$$\begin{array}{rcl}
 N & = & 73^\circ 21' \\
 180^\circ - \psi & = & 143 \quad 42 \\
 P & & \hline
 & & 217 \quad 3
 \end{array}$$

which is estimated from the north point of the moon's limb toward the east.



*Elements of Occultations.*—Pages 419—447 give the elements for the prediction of the times of occultation of stars and planets by the moon. In the columns referring to the star, those headed *Red'ns from 1888.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1888 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

The quantities in the following five columns are all given for the moment of geocentric conjunction of the star and moon in right ascension. Let there be a line passing from the star through the centre of the moon, and let a plane perpendicular to this line pass through the centre of the earth: this plane will be the fundamental plane for the occultation. The system of co-ordinates is similar to that already described for eclipses. The cone circumscribing the moon and star may be regarded as a cylinder having everywhere the same diameter as the moon. This cylinder will intercept the fundamental plane in a circle of which the linear diameter will be the same as that of the moon.

The *Washington Mean Time* is the moment at which the two bodies are in geocentric conjunction in right ascension. At this moment the co-ordinate  $x$  of the axis of the cylinder on the fundamental plane has the value zero. The column *Hour-Angle H* gives the common geocentric hour-angle of the moon and star at the same moment, counted from the meridian of Washington—positive toward the west and negative toward the east. Column *Y* gives the co-ordinate  $y$  of the axis of the cylinder upon the fundamental plane at the same moment. Columns  $x'$  and  $y'$  give the hourly variation of  $x$  and  $y$ . The linear unit in these columns is the earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the Washington mean time of immersion and emersion of a star behind the limb of the moon may be computed for any part of the earth by a method nearly the same as that already explained for computing eclipses, only more simple.

We shall first show how to compute an isolated occultation for a particular place, assuming it to be visible at that place, and then show how all the occultations which will be visible at a place may be selected and computed by a more rapid process.

(1) The geocentric co-ordinates of the place,  $\rho \sin \varphi'$  and  $\rho \cos \varphi'$ , are to be computed with three or four places of decimals by the formulæ,

$$\begin{aligned}\rho \sin \varphi' &= \frac{\sin \varphi}{G} \\ \rho \cos \varphi' &= F \cos \varphi\end{aligned}$$

already given in connection with the eclipses.

As in the case of eclipses, it is necessary to have an approximate time of the phenomenon, corresponding to that obtained from the charts of the eclipses. The quantity  $H$  being the Washington west hour-angle of the two bodies at the moment of geocentric conjunction,  $H - \lambda$  will be the local hour-angle of the star at this same moment. Let us call this angle  $h_0$ , putting

$$h_0 = H - \lambda$$

where  $\lambda$  is the longitude west of *Washington*.

The next step will then be to find the approximate moment of apparent conjunction in right ascension as seen from the place. An approximate correction to reduce the time and hour-angle for geocentric conjunction to those for apparent conjunction may be taken from Mr. DOWNES's table, on pages 448—449. This correction will have the same sign as  $h_0$ .

When this table is not available, the correction may be computed thus: Compute the quantities  $\xi_0$ ,  $\xi'$  and  $\tau$  from the formulæ,

$$\begin{aligned}\xi_0 &= \rho \cos \varphi' \sin h_0 \\ \xi' &= [9.4192] \cos (h_0 + \frac{1}{3} h_0) \\ \tau &= \frac{\xi_0}{x' - \xi'}\end{aligned}$$

$\tau$  will then be the approximate interval between the times of geocentric and local conjunction. By applying it to the Washington mean time of the former, as given with the elements, we shall have the Washington mean time of the latter within a few minutes.

The average duration of an occultation is about an hour. Thence, by adding  $0^h.5$  to and subtracting it from the mean time of apparent conjunction, we shall have approximate times of the phases of immersion and emersion for farther computation. Let us then put,

$$\tau_1 = \tau - 0^h.5$$

$$\tau_2 = \tau + 0^h.5$$

$T$ , the Washington mean time of geocentric conjunction in R. A.

$d$ , the declination of the star.

(2) Compute for the moments  $T + \tau_1$  and  $T + \tau_2$  the following quantities, in which we write  $\tau$  for each of the quantities  $\tau_1$  and  $\tau_2$ . The latter, when used as angles, are to be changed to arc by multiplying by 15, and the minutes are to be further increased by one-sixth the number of degrees in order to reduce to the sidereal hour-angle.

$$\xi = \rho \cos \varphi' \sin (h_0 + \tau)$$

$$\eta = \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (h_0 + \tau)$$

$$\xi' = [9.4192] \rho \cos \varphi' \cos (h_0 + \tau)$$

$$\eta' = [9.4192] \rho \cos \varphi' \sin d \sin (h_0 + \tau) = [9.4192] \xi \sin d$$

$$x = x' \tau$$

$$y = Y + y' \tau$$

Compute  $m$ ,  $M$ ,  $n$  and  $N$  from the equations

$$m \sin M = x - \xi$$

$$m \cos M = y - \eta$$

$$n \sin N = x' - \xi'$$

$$n \cos N = y' - \eta'$$

$$n' = \frac{n}{60} = [8.2218] n$$

$$\sin \psi = [0.5650] m \sin (M - N)$$

Then,  $t_1$  and  $t_2$  from the equations

$$t_1 = -\frac{m}{n'} \cos (M - N) - \frac{[9.4350]}{n'} \cos \psi \quad (\text{Beginning.})$$

$$t_2 = -\frac{m}{n'} \cos (M - N) + \frac{[9.4350]}{n'} \cos \psi \quad (\text{End.})$$

The quantities  $t_1$  and  $t_2$  will then be the corrections in minutes to be applied to the respective times  $T + \tau_1$  and  $T + \tau_2$  to obtain the Washington mean times of the phases.

As in the case of eclipses, the small value of  $t_1$  will give an accurate result for one phase, and the large value an inaccurate result for the other. Both accurate results may then be corrected by comparison with the inaccurate one, in the way described for eclipses, and a result obtained which will probably be correct within a fraction of a minute of time.

As a check upon the result, it will be advisable to compute  $\xi$ ,  $\eta$ ,  $x$  and  $y$  for the moments finally obtained. If the times are correct these quantities will fulfil the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2723$$

If  $\log m \sin (M - N) = 9.4350$  nearly, a recalculation will generally be necessary to determine whether, numerically,  $\sin \psi < 1$ , or  $\sin \psi > 1$ . In the latter case, the impossible value of  $\sin \psi$  indicates that an occultation at the given place is impossible, unless the computed distance from the moon's limb is within the errors of the ephemerides of the moon and star.

In such cases of near approach to the moon's limb, we may take  $\psi = 90^\circ$ , or  $270^\circ$ , according as  $\sin (M - N)$  is positive or negative; and for finding the time of nearest approach,

$$t = -\frac{m \cos (M - N)}{n'}$$

Putting  $\pi$  for the moon's horizontal parallax, the distance from the moon's limb will be,

$$\pi [m \sin (M - N) - 0.2723]$$

disregarding the sign of  $\sin (M - N)$ ; or, allowing for the augmentation of the semidiameter,

$$\pi [m \sin (M - N) - 0.2723] [1 + z \sin \pi]$$

where

$$z = \rho \cos \varphi' \cos d \cos (h_0 + \tau) + \rho \sin \varphi' \sin d$$

The position-angle,  $P$ , of the line from the moon's centre to the star at the times of contact, reckoned from the north point toward the east, is given by the formulæ:—

$$P = N - \psi \quad \text{for immersion,}$$

$$P = N + \psi \pm 180^\circ \quad \text{for emersion,}$$

it being supposed that the value of  $\psi$ , in each case, is taken between the limits  $\pm 90^\circ$ .

To find the angle from the vertex, we compute the angle  $C$  from the formula,

$$\tan C = \frac{\xi + t \xi'}{\eta + t \eta'}$$

in which the value of  $t$  corresponding to the phase is to be used. Then

$$V = P - C$$

is the angle from the vertex, also reckoned from the north toward the east.

As an example of an isolated occultation, we shall compute that of  $\delta$  Capricorni, 1888, August 20, for Glasgow, Missouri, whose position is

$$\varphi = + 39^\circ 13' 45''.6$$

$$\lambda = + 1^h 3^m 5^s.93$$

$$\text{Constants for the given place,} \quad \log \rho \sin \varphi' = 9.79868$$

$$\log \rho \cos \varphi' = 9.88967$$

$$\text{From the table of elements, page 435} \quad H = - 0^h 43^m.1$$

$$\text{Hence} \quad h_0 = H - \lambda = - 1^h 46^m.2$$

From DOWNES's Table, pages 448—449, or from the formulæ on page 508, we find the correction to be applied to the Washington mean time of geocentric conjunction as given on page 435, to obtain the approximate Washington mean time of apparent conjunction, which is thus found to be  $10^h 5^m.2$ .

As the duration of the occultation will be about one hour we shall therefore subtract and add  $30^m$  and we shall have the approximate Washington mean times of immersion and emersion to be used in the computation; thus:

$$\begin{array}{lll} \text{For Immersion,} & \tau_1 = - 1.383; & T_1 = \text{Aug. 20, } 9^h 35.2^m \\ \text{For Emersion,} & \tau_2 = - 0.383; & T_2 = \text{Aug. 20, } 10^h 35.2^m \end{array}$$

	Immersion.	Emersion.
	$h$ $m$	$h$ $m$
$h_0$	— 1 46.20	— 1 46.20
$\tau$ (in sidereal time)	— 1 23.23	— 0 23.06
$h_0 + \tau$	— 3 9.43	— 2 9.26
$h_0 + \tau$ (in arc)	— 47° 21' 27"	— 32° 18' 54"
$\sin d$	9.45670 $n$	9.45670 $n$
$\cos d$	9.98144	9.98144
$\rho \cos \varphi'$	9.88967	9.88967
$\sin (h_0 + \tau)$	9.86664 $n$	9.72801 $n$
$\log \xi$	9.75631 $n$	9.61768 $n$
$\xi$	— 0.57057	— 0.41465

	Immersion.	Emerston.
$\rho \sin \varphi'$	9.79868	9.79868
$\cos d$	9.98144	9.98144
$\log \rho \sin \varphi' \cos d$	9.78012	9.78012
(1)	+ 0.60273	+ 0.60273
$\rho \cos \varphi'$	9.88967	9.88967
$\sin d$	9.45670 <i>n</i>	9.45670 <i>n</i>
$\cos (h_0 + \tau)$	9.83086	9.92692
$\log \rho \cos \varphi' \sin d \cos (h_0 + \tau)$	9.17723 <i>n</i>	9.27329 <i>n</i>
(2)	- 0.15039	- 0.18763
(1)-(2)	+ 0.75312	+ 0.79036
(const.) $\log$	9.41920	9.41920
$\rho \cos \varphi' \cos (h_0 + \tau)$	9.72053	9.81659
$\log \xi'$	9.13973	9.23579
$\xi'$	+ 0.13795	+ 0.17210
(const.) $\log$	9.41920	9.41920
$\log \xi$	9.75631 <i>n</i>	9.61768 <i>n</i>
$\sin d$	9.45670 <i>n</i>	9.45670 <i>n</i>
$\log \eta'$	8.63221	8.49358
$\eta'$	+ 0.04288	+ 0.03116
$\log x'$	9.75174	9.75174
$\log \tau$	0.14092 <i>n</i>	9.58357 <i>n</i>
$\log x$	9.89266 <i>n</i>	9.33531 <i>n</i>
$x$	- 0.78102	- 0.21642
$\xi$	- 0.57057	- 0.41465
$x - \xi$	- 0.21045	+ 0.19823
$\log y'$	9.15685	9.15685
$\log \tau$	0.14092 <i>n</i>	9.58357 <i>n</i>
$\log y' \tau$	9.29777 <i>n</i>	8.74042 <i>n</i>
$y' \tau$	- 0.19850	- 0.05501
$Y$	+ 0.70550	+ 0.70550
$Y + y' \tau = y$	+ 0.50700	+ 0.65049
$\eta$	+ 0.75312	+ 0.79036
$y - \eta$	- 0.24612	- 0.13987
$x' - \xi'$	+ 0.42665	+ 0.39250
$y' - \eta'$	+ 0.10062	+ 0.11234
$\log m \sin M$	9.32315 <i>n</i>	9.29716
$\log m \cos M$	9.39115 <i>n</i>	9.14573 <i>n</i>
$\tan M$	9.93200	0.15143 <i>n</i>
$M$	220° 32' 0"	125° 12' 26"
$\sin M$	9.81284 <i>n</i>	9.91226
$\log m$	9.51031	9.38490
$\log n \sin N$	9.63007	9.59384
$\log n \cos N$	9.00268	9.05053
$\tan N$	0.62739	0.54331
$N$	76° 43' 47"	74° 1' 41"

	Immersion.	Emerison.
$\cos N$	9.36087	9.43960
$\log n$	9.64181	9.61093
const. $\log$	8.22180	8.22180
$\log n'$	7.86361	7.83273
$M - N$	143° 48' 13''	51° 10' 45''
$\sin (M - N)$	9.77125	9.89159
$\log m$	9.51031	9.38490
const. $\log$	0.56500	0.56500
$\sin \psi$	9.84656	9.84149
$\psi$	44° 37'	43° 57' 50''
$\cos (M - N)$	9.90687 $n$	9.79720
$\log \frac{m}{n'}$	1.64670	1.55217
$\log \frac{m}{n'} \cos (M - N)$	1.55357 $n$	1.34937
$\cos \psi$	9.85237	9.85720
$[9.43500] \div n'$	1.57139	1.60227
	1.42376	1.45947
$-\frac{m}{n'} \cos (M - N)$	+ 35.774	- 22.355
$\frac{[9.43500]}{n'} \cos \psi$	$\mp$ 26.531	$\pm$ 28.805
$t_1$	+ 9.243	+ 6.450
$t_2$ (inaccurate)	+ 62.305	- 51.160
Washington conjunction + $\tau$	9 <sup>h</sup> 35.2	10 35.2
Washington mean time of phase, Aug. 20,	9 44.443	10 41.65
- $\lambda$	1 3.990	1 3.99
Glasgow mean time of phase, Aug. 20,	8 40.453	9 37.66

A recomputation for these dates gives the following results:

Glasgow mean time of phase, Aug. 20,	8 <sup>h</sup> 40 <sup>m</sup> .55	9 <sup>h</sup> 37 <sup>m</sup> .84
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The position angles ( $Q$ ) are

	At Immersion.	At Emersion.
$N$	76° 43.8	74° 1.7
$\psi$	44 37	43 57.8
		+ 180
$Q$	32 6.8	297 59.5

*Prediction of Many Occultations for a Given Place.*—When it is desired to predict all the occultations which will be visible at some one place, tables may be constructed and applied in such a way as to greatly diminish the labor of computation. In using such tables, the most convenient course will be to find for each occultation the hour-angle of the star at the moment of apparent conjunction in right ascension, as seen from the place of observation. The table of elements, pages 419—447, gives  $H$ , the Washington hour-angle at the moment of geocentric conjunction. The corresponding geocentric hour-angle at the place will be

$$h_0 = H - \lambda \quad (\lambda = \text{west longitude from Washington}).$$

The moment of apparent conjunction, as seen from the station, will be given by the condition  $\xi = x$ ; or, using the values of  $\xi$  and  $x$ ,

$$\rho \cos \varphi' \sin h = x' \tau$$

$h$  being the west hour-angle of the star at the moment in question, and  $\tau$  the interval, in hours of mean time, which has elapsed since geocentric conjunction. We shall therefore have,

$$h = h_0 + \tau$$

for the hour-angle at the end of the interval  $\tau$  after geocentric conjunction. In strictness,  $\tau$  should here be multiplied by the factor  $1 + \frac{1}{365.25}$ , because the star moves a little more than  $15^\circ$  in an hour of mean time; but the error arising from the neglect of the factor is too small to be important, as it will affect the predicted time of conjunction by less than 10 seconds. The equation for finding  $\tau$  is therefore,

$$\rho \cos \varphi' \sin (h_0 + \tau) = x' \tau$$

The quantities  $h_0$  and  $x'$  being derived immediately from the data of the Ephemeris, the quantity  $\tau$  is readily obtained by successive approximation, and may be tabulated as a function of  $h_0$  and  $x'$ . The computation of  $\tau$  is effected as follows: We have

$$\sin (h_0 + \tau) = \sin h_0 + 2 \sin \frac{1}{2} \tau \cos (h_0 + \frac{1}{2} \tau) \quad (1)$$

The value of  $\tau$  in arc being seldom more than  $24^\circ$  we may put  $\tau$  itself for  $2 \sin \frac{1}{2} \tau$ . The equation will then become

$$\rho \cos \varphi' \sin h_0 + \tau \rho \cos \varphi' \cos (h_0 + \frac{1}{2} \tau) = x' \tau$$

from which we find

$$\tau = \frac{\rho \cos \varphi' \sin h_0}{x' - \rho \cos \varphi' \cos (h_0 + \frac{1}{2} \tau)} \quad (2)$$

To tabulate  $\tau$ , we must first have a table of the quantities

$$\begin{aligned} \xi &= \rho \cos \varphi' \sin h \\ \xi' &= [9.41916] \rho \cos \varphi' \cos h \end{aligned} \quad (3)$$

which table may be formed for every 10 minutes (in time) of  $h$ . If we then put  $\xi_0$  for the value of  $\xi$  corresponding to  $h = h_0$  and  $\xi'_1$  for the value of  $\xi'$  corresponding to  $h = h_0 + \frac{1}{2} \tau$ , we shall have

$$\tau = \frac{\xi_0}{x' - \xi'_1} \quad (4)$$

Since we must know the value of  $\tau$ , approximately, before we can take  $\xi'_1$  from the table, this equation can be solved only by successive approximations. The approximations converge so rapidly as to offer no difficulty. It will be best to begin by computing values of  $\tau$  for the two extremes of  $x'$ , namely,  $x' = 0.48$  and  $x' = 0.60$ , because the approximate values of  $\tau$  can then be interpolated for all intermediate values of  $x'$ . For the first approximation may be taken—

$$\begin{aligned} \frac{1}{2} \tau &= 50^m \sin \frac{4}{3} h_0 \quad (\text{for } x' = 0.48) \\ \frac{1}{2} \tau &= 40^m \sin \frac{4}{3} h_0 \quad (\text{for } x' = 0.60) \end{aligned} \quad (5)$$

or, the approximate values of  $\tau$  may be taken from Mr. DOWNES's table, pages 448—449. It will be best to make the computation for every  $30^m$  of  $h_0$ , and to find the intermediate values of  $\tau$  for every  $10^m$  by interpolation. Then for each  $30^m$  of  $h_0$  we take  $\xi'$  from a table with the argument  $h_0 + \frac{1}{2} \tau$ , and  $\log \xi$  with the argument  $h_0$ , and thence compute  $\tau$  by (4). If the value of  $\tau$  thus arrived at differs more than  $3^m$  from that employed in taking out  $\xi'$ , a new value may be used to correct  $\xi'$ , and the computation may be repeated. The values corresponding to  $x' = 0.51$ ,  $x' = 0.54$ , and  $x' = 0.57$ , can then be computed with the single interpo-

lation of approximate values of  $\tau$ , and afterward the table can be extended by interpolation to every 0.01 of  $x'$  between  $x'_c=0.48$  and  $x'=0.62$ . It will be best to compute  $\tau$  in the first place to every 0.001 of an hour, and to drop the last figure in forming the definitive table. The table thus formed will be called *Table I*.

The values of  $\eta$  and  $\eta'$  may then be tabulated for every degree of the star's declination, and every 10<sup>m</sup> of  $h$ . It will not be really necessary to compute the table for negative values of  $d$ , since by putting

$$\begin{aligned}\eta_1 &= \rho \sin \varphi' \cos d \\ \eta_2 &= -\rho \cos \varphi' \sin d \cos h\end{aligned}$$

$\eta_1$  may be given in a table of single-entry; and taking  $\eta_2$  from the table of double-entry for a positive  $d$ , we shall have

$$\eta = \eta_1 \pm \eta_2$$

the lower sign being used for a negative  $d$ . But the extension of the table for  $\eta$  to negative values of  $d$  is so readily made that it will probably be found better to do it, so as to save taking out  $\eta_1$  and  $\eta_2$  separately.

This table for  $\eta$  will be called *Table II*, and the corresponding one for  $\eta'$  with the same arguments *Table III*. The precepts for using the tables will then be as follow:—

From *Table I* with the arguments  $x'$  and  $H - \lambda = h_0$  take out the value of  $\tau$ . It will be sufficient to use the nearest 0.01 of  $x'$ .  $\tau$  will be of the same sign as  $h_0$ . Then, enter *Table II* with the arguments  $d$  (the star's declination) and  $h = h_0 + \tau$ , and take out the value of  $\eta$ . Form the quantities  $y = Y + y' \tau$ , and  $y - \eta$ . If the latter quantity lies between the limits  $\pm 0.28$ , it is almost certain that there will be an occultation. If it falls without the limits  $\pm 0.33$ , it is almost certain that there will not be an occultation. Between the years 1881 and 1890 these last limits may be reduced to  $\pm 0.32$ , and cases near this limit may be rejected if  $y'$  is small. A convenient rule to adopt will be—

$$\begin{aligned}y' < 0.10, & \text{ limits } = \pm 0.29 \\ 0.10 < y' < 0.15, & \text{ limits } = \pm 0.30 \\ 0.15 < y' < 0.20, & \text{ limits } = \pm 0.31 \\ 0.20 < y' & \text{ limits } = \pm 0.33 \text{ or } \pm 0.32\end{aligned}$$

Here, only the absolute value of  $y'$  is to be considered, without respect to its algebraic sign.

If  $y - \eta$  falls between the limits thus indicated, take the values of  $\xi'$  and  $\eta'$  from the appropriate tables and compute  $v$ ,  $Q$  and  $\Delta$  from the equations

$$\begin{aligned}v \sin Q &= y' - \eta' \\ v \cos Q &= x' - \xi' \\ \Delta &= (y - \eta) \cos Q\end{aligned}$$

If  $\Delta > 0.2723$  or  $\log \Delta > 9.4350$  there will be no occultation, though the moon may graze the star when  $\Delta = 0.2723$  is very small. If  $\Delta < 0.2723$ , compute

$$\begin{aligned}\tau_1 &= -\frac{y - \eta}{v} \sin Q & \cos P &= \frac{\Delta}{0.2723} \quad (P < 180^\circ) \\ \tau_2 &= \frac{0.2723 \sin P}{v}\end{aligned}$$

We shall then have—

Local mean time of immersion,  $T - \lambda + \tau + \tau_1 - \tau_2$

Local mean time of emersion,  $T - \lambda + \tau + \tau_1 + \tau_2$

Position-angle from north toward east at immersion,  $180^\circ - Q - P$

Position-angle from north toward east at emersion,  $180^\circ - Q + P$

In predicting the occultations for a given place, the first operation will be to go over the list of occultations in the Ephemeris, and select those which may be visible. The conditions of possible visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.
2. The quantity  $H - \lambda$ , taken without regard to sign, must be less than the semi-diurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east horizon, or an immersion in the west, when this difference is a few minutes less than an hour.
3. The sun must not be much more than an hour above the horizon at the local mean time  $T - \lambda$ , unless the star is bright enough to be seen in the day time.

The most convenient course will be to write the value of  $-\lambda$  on the bottom of a sheet of paper, and, passing through the list of occultations, pause over each one for which condition (1) is fulfilled, and examine whether conditions (2) and (3) are fulfilled. If either fails, the computer passes on. Very often it will require some examination to find whether  $H - \lambda$  or  $T - \lambda$  falls within the limits; in these cases, the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

*Phenomena of Planets and Satellites*, pages 450—485.—These are, for the most part, sufficiently explained in the body of the work. The following additional explanations are added for completeness.

*Disks of Mercury and Venus*, pages 450—451.—The angle  $\theta$ , needed in reducing meridian observations, is the angle which the arc of the great circle from the planet to the sun, makes with the arc from the planet toward the west, reckoned in the direction west, north, east, south. This position-angle is reckoned from  $0^\circ$  to  $360^\circ$ , as in the measurement of double stars, the planet taking the place of the central star. But its measure is  $90^\circ$  greater than that of a double star.

We may also regard  $\theta$  as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

*Satellites and Disk of Mars*, page 452.—This page gives the Washington mean times of the greatest eastern and western elongations, the position angles and the distances of the satellites from the centre of the planet, for three weeks preceding and following opposition.

*Satellites of Jupiter*, pages 453—477.—The times of phenomena are explained at the foot of each page; the diagram is on page 453.

*Phenomena*, pages 484—485.—The conjunctions, quadratures, and oppositions of the planets with respect to the sun, give the hours when the longitude of each planet differs from that of the sun by  $0^\circ$ ,  $90^\circ$  or  $180^\circ$ .

The conjunctions of the moon and planets with each other are given in right ascension. The degrees and minutes to the right show the difference of declination at the moment of conjunction.

*Latitude by Observed Altitude of Polaris*.—Table IV replaces the Tables A, B, C, D, given as a *Supplement* to the volumes of the Ephemeris for 1874—1881, and is intended for use at sea and reconnaissance on land. It will furnish an approximate value of the latitude, the probable error of which, in so far as the table is concerned, will be a few tenths of a minute of arc.

The directions for using the table are adapted to a right ascension of Polaris equal to  $1^h 17^m.6$ . Somewhat greater accuracy may be insured by substituting the right ascension of Polaris at the date of observation, from pages 302—313 of this volume.





## APPENDIX.

### ON THE CONSTRUCTION OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC FOR 1888.

THE adopted constants of precession, nutation, and aberration are those of STRUVE and PETERS, namely:—

$$\begin{aligned}\text{Precession} &= 50''.2411 + 0''.0002268 \, t \\ \text{Nutation} &= 9''.2231 + 0''.000009 \, t \\ \text{Aberration} &= 20''.4451\end{aligned}$$

in which  $t$  is the number of years after 1800.0.

The obliquity of the ecliptic is that of HANSEN's *Tables du Soleil*, which is  $0''.31$  greater than that of PETERS, given in the issues of this Ephemeris preceding that for 1882. A comparison of HANSEN's mean obliquity with that of PETERS and of LE VERRIER at different epochs is given in the following table:—

Epoch.	HANSEN.			PETERS.	LE VERRIER.	H.—P.	H.—L.
	°	'	"	"	"	"	"
1750	23	28	18.19	17.44	19.42	+ 0.75	— 1.23
1800	23	27	54.80	54.22	55.63	+ 0.58	— 0.83
1850	23	27	31.42	30.99	31.83	+ 0.43	— 0.41
1900	23	27	8.02	7.76	8.03	+ 0.26	— 0.01

The formulæ for reducing the places of the fixed stars, page 280, correspond to the *Star Tables of the American Ephemeris*, Washington, 1869.

The mean right ascensions of stars have been reduced to NEWCOMB's fundamental standard in the catalogue attached to the *Washington Observations for 1870*, Appendix II, with the following exceptions: The right ascensions of the 48 circumpolar stars north of  $60^\circ$  north declination are from Dr. GOULD's *Standard Places of Fundamental Stars*, second edition, United States Coast Survey Office, 1866. Of the twelve stars south of  $50^\circ$  south declination, the positions of  $\beta$  Hydri,  $\alpha$  Trianguli Australis, and  $\sigma$  Octantis, have been corrected from data furnished by Dr. GOULD; while the remaining nine are, as before, from the *British Nautical Almanac* for 1848.

The right ascensions of additional stars in the general list, for which no apparent places are given in the subsequent section, have been taken partly from the *Catalogue of 1098 Standard Clock and Zodiacal Stars*, forming Part IV of Vol. I of *Astronomical Papers Prepared for the Use of the American Ephemeris and Nautical Almanac*, Washington, 1881; and partly from the catalogue of the *Astronomische Gesellschaft* of 1878. A few have been derived from recent catalogues without a rigorous reduction for equinox.

The mean declinations of stars are taken from BOSS's paper in the *Report of the Northern Boundary Commission*, Washington, 1879, for all stars found therein. The declinations of all the other stars have been reduced to the same standard, except those of the additional ones above, which have been taken partly from the *Astronomische Gesellschaft* list, and partly from places in recent catalogues. To the apparent places of Sirius and Procyon have been applied the periodic corrections resulting from AUWERS's investigations.

The values of these corrections are:—

Year.	Sirius.		Procyon.	
1888.0	$\Delta \alpha = + 0.063$	$\Delta \delta = - 0.97$	$\Delta \alpha = + 0.026$	$\Delta \delta = + 0.97$
1889.0	$\Delta \alpha = + 0.086$	$\Delta \delta = - 0.89$	$\Delta \alpha = + 0.036$	$\Delta \delta = + 0.90$

The ephemeris of the sun is constructed from HANSEN and OLUFSEN's *Tables du Soleil*, Copenhagen, 1853, except that STRUVE's aberration has been used. This is equivalent to adding  $0''.19$  to the true longitudes, but it does not affect the right ascensions and declinations. The sun's rectangular equatorial co-ordinates have been computed from the longitudes and latitudes by the following formulæ:—

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R \sin \lambda \cos \omega - 19.3 R \beta \\ Z &= R \sin \lambda \sin \omega + 44.5 R \beta \end{aligned}$$

The reductions to mean equinox, 1888.0, are computed by the formulæ,

$$\begin{aligned} \Delta X' &= + Y \sec \omega \Delta \lambda \sin 1'' \\ \Delta Y' &= - X \cos \omega \Delta \lambda \sin 1'' + Z \Delta \omega \sin 1'' - 9.4 \tau R \sin (\lambda + 187^\circ) \\ \Delta Z' &= - X \sin \omega \Delta \lambda \sin 1'' - Y \Delta \omega \sin 1'' + 21.7 \tau R \sin (\lambda + 187^\circ) \end{aligned}$$

Wherein—

- $\lambda$  and  $\beta$  are the longitude and latitude of the sun referred to the equinox and ecliptic of the date;
- $\omega$ , the obliquity of the ecliptic;
- $\Delta \lambda$ , the reduction of longitude for precession and nutation from January 0;
- $\Delta \omega$ , the reduction of the mean to the apparent obliquity;
- $\tau$ , the fraction of the year since January 0.

The numerical coefficients are in units of the seventh place of decimals. The correction for latitude has been taken from GOETZE's paper in the *Astronomical Journal*, Vol. II, page 71.

The mean equatorial horizontal parallax of the sun, adopted from Professor NEWCOMB's *Investigation of the Distance of the Sun and the Elements which depend on it*,\* is  $8''.848$ . The adopted semidiameter of the sun at the earth's mean distance is  $16' 2''$ . In the computations pertaining to eclipses, BESSEL's semidiameter,  $15' 59''.788$  has been used.

The right ascension, declination and parallax of the moon are derived from HANSEN's *Tables de la Lune*, London, 1857, the mean longitude being corrected in accordance with NEWCOMB's *Researches on the Motion of the Moon*, Part I, page 268,† and a corrected table being substituted for Table XXXIV.

The semidiameter of the moon is computed from the moon's horizontal parallax by the formula,

$$S = 0.272274 \pi + 2''.5$$

The constant  $2''.5$  is omitted in the computation of eclipses and occultations, as due entirely to telescopic and ocular irradiation.

The ephemeris of Mercury is derived from Professor WINLOCK's *Tables of Mercury*, Washington, 1864. They are based on the older theory of LE VERRIER, published in the *Additions to the Connaissance des Temps* for 1848.

The ephemeris of Venus is derived from Mr. G. W. HILL's *Tables of Venus*, Washington, 1872.

The ephemeris of Mars is derived from manuscript tables constructed from LINDENAU's *Tables*. Mr. HUGH BREEN's results, contained in his paper *On the Corrections of LINDENAU's Elements of Mars*, published in the *Memoirs of the Royal Astronomical Society*, Vol. XX, have also been discussed and applied; and LE VERRIER's secular variations of the elements are likewise adopted. The perturbations produced by Jupiter have been increased by  $\frac{1}{11}$  of their value. The following are the corresponding corrected elements and annual variations for Washington, 1855.0:—

$$\begin{aligned} L &= 320^\circ 13' 33''.87 + 689101''.1527 \ t \\ \pi &= 333 \ 23 \ 17.84 + 65.9990 \ t \\ Q &= 48 \ 25 \ 55.29 + 27.6997 \ t \\ i &= 1 \ 51 \ 2.20 - 0.02141 \ t \\ e &= 19238''.75 + 0.18549 \ t \\ n &= 689050''.8927 \\ a &= 1.5236915 \end{aligned}$$

The ephemeris of Jupiter is derived from manuscript tables constructed from BOUVARD's *Tables*, with such changes as were required to make them correspond more nearly to the formulæ.

The ephemeris of Saturn is derived from a provisional theory constructed by Mr. GEORGE W. HILL, and still unpublished.

The ephemerides of Uranus and Neptune are derived from Professor NEWCOMB's *Tables*, published by the *Smithsonian Institution*.

\* *Astronomical Observations made at the U. S. Naval Observatory, Washington, 1865, Appendix II.*

† *Astronomical Observations made at the U. S. Naval Observatory, Washington, 1875, Appendix II.*

The semidiameters of the planets are computed from the following values:—

	Semidiameter.	Log Dist.	Authority.
Mercury	3.34 "	0.00	LE VERRIER, <i>Theory of Mercury</i> .
Venus	8.546 ± 0.086	0.00	PEIRCE, from the Washington Observations of 1845 and 1846, made with the Mural Circle.
Mars	2.842 ± 0.057	0.25	
Jupiter (polar)	18.78 ± 0.067	0.70	
Saturn (polar)	8.77 ± 0.039	0.95	
Uranus	1.68 ± 0.3	1.30	
Neptune	1.28	1.48	
Jupiter (equatorial)	20.00	0.70	
Saturn (equatorial)	9.38	0.95	

The elements of eclipses of the sun and occultations of stars by the moon are adapted to BESSEL's method, using the special forms in CHAUVENET's *Spherical and Practical Astronomy*. The adopted semidiameters are:—

Semidiameter of the sun at distance unity. . . .	959".788
Ratio of radius of moon to radius of earth . . . .	0.27227

The eclipses of Jupiter's satellites are computed from TODD's *Continuation of DAMOISEAU's Tables*, Washington, 1876. The occultations, transits, etc., are computed from WOOLHOUSE's *Tables, British Nautical Almanac* for 1835, Table II of each satellite having been adapted to DAMOISEAU's Tables.

The elongations and conjunctions of the satellites of Saturn are computed from manuscript tables prepared by Professor NEWCOMB.

The apparent elements of the rings of Saturn are computed from BESSEL's data, except those for the dusky ring.

The elongations of the satellites of Uranus, and of the satellite of Neptune are computed from the data of Professor NEWCOMB's *Uranian and Neptunian Systems*, Washington, 1875.

In compiling the positions of observatories, the latest available data have been used. The positions have been furnished, in many instances, through the courtesy of the directors of the Observatories, in response to a circular issued by the Superintendent of the American Ephemeris.

The reduction to geocentric latitude, and the logarithm of the radius of the earth, are derived from BESSEL's elements of the terrestrial spheroid, as adopted in Table III of CHAUVENET's *Spherical and Practical Astronomy*, Vol. II:—

$$\begin{aligned}\log e &= 8.9122052 \\ \varphi' - \varphi &= -11' 30''.65 \sin 2 \varphi + 1''.16 \sin 4 \varphi \\ \log \rho &= 9.9992747 + 0.0007271 \cos 2 \varphi - 0.0000018 \cos 4 \varphi\end{aligned}$$

Table IV, for finding the latitude from an observed altitude of Polaris, is constructed for—

- (1) An altitude of Polaris equal to 45°.
- (2) A declination of Polaris equal to + 88° 42'.4.

The principal computations of the Ephemeris have been distributed in the following manner:—

The sun has been computed by Mr. EASTWOOD; the moon's longitude, latitude, semidiameter and horizontal parallax, by Professor KEITH; right ascension and declination, by Professor VAN VLECK; culminations, by Professor RUNKLE; lunar distances, by Mr. W. B. OLIVER; Mercury and Venus, by Mr. E. P. AUSTIN; Mars, Jupiter, Saturn, Uranus, and Neptune, by Mr. ROBERDEAU BUCHANAN; Jupiter's satellites, by Mr. W. F. McK. RITTER. The fixed stars have been prepared by Mr. WIESSNER and Mr. H. MEIER; the general constants for their reduction, by Mr. WIESSNER; the occultations, by Mr. J. O. WIESSNER; and the eclipses have been computed and the charts projected by Mr. BUCHANAN.



TABLE I.

**CORRECTION REQUIRED, ON ACCOUNT OF SECOND DIFFERENCES OF THE MOON'S  
MOTION, IN FINDING THE GREENWICH TIME CORRESPONDING  
TO A CORRECTED LUNAR DISTANCE.**

Approximate Interval.		DIFFERENCE OF THE PROPORTIONAL LOGARITHMS IN THE EPHEMERIS.																											
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52		
h	m	h	m	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	10	2	50	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	
0	20	2	40	0	1	1	1	1	2	2	2	2	2	3	3	3	4	4	4	5	5	5	5	6	6	6	6	6	
0	30	2	30	0	1	1	2	2	2	2	3	3	3	4	4	5	5	6	6	7	7	7	8	8	8	9	9	9	
0	40	2	20	0	1	1	2	2	3	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	10	11	11	
0	50	2	10	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13	
1	0	2	0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	14	14	
1	10	1	50	1	1	2	2	3	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	15	15	
1	20	1	40	1	1	2	3	3	4	4	5	6	6	7	8	9	9	10	10	11	12	12	13	14	14	15	16	16	
1	30	1	30	1	1	2	3	3	4	4	5	6	6	7	8	9	9	10	11	11	12	12	13	14	15	16	16	16	
Approximate Interval.		DIFFERENCE OF THE PROPORTIONAL LOGARITHMS IN THE EPHEMERIS.																											
		54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100				
h	m	h	m	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s		
0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	10	2	50	4	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7		
0	20	2	40	7	7	7	7	8	8	8	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	12	12		
0	30	2	30	9	10	10	10	11	11	12	12	12	13	13	13	14	14	14	15	15	16	16	16	17	17	17	17		
0	40	2	20	12	12	13	13	13	14	14	15	15	16	16	16	17	17	18	18	19	19	20	20	21	21	22	22		
0	50	2	10	14	14	15	15	16	16	16	17	17	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25		
1	0	2	0	15	16	16	17	17	18	18	19	19	20	21	21	22	22	23	23	24	24	25	25	26	27	27	28		
1	10	1	50	16	17	17	18	18	19	19	20	21	21	22	22	23	24	24	25	25	26	27	27	28	28	29	30		
1	20	1	40	17	17	18	19	19	20	20	21	21	22	23	23	24	25	25	26	26	27	28	28	29	30	31	31		
1	30	1	30	17	18	18	19	19	20	21	21	22	23	23	24	24	25	25	26	27	27	28	29	30	31	31	31		
Approximate Interval.		DIFFERENCE OF THE PROPORTIONAL LOGARITHMS IN THE EPHEMERIS.																											
		102	104	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	
h	m	h	m	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s		
0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	10	2	50	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9		
0	20	2	40	13	13	13	13	14	14	14	14	15	15	15	15	15	15	15	16	16	16	16	17	17	17	17	17		
0	30	2	30	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	22	22	23	23	24	24	24	24	24		
0	40	2	20	22	22	23	23	24	24	25	25	25	26	26	26	27	27	27	28	28	28	29	29	30	30	30	30		
0	50	2	10	26	26	26	27	27	28	28	29	29	30	30	31	31	31	32	32	32	33	33	34	34	34	34	34		
1	0	2	0	28	29	29	30	30	31	31	32	33	33	34	34	35	35	35	36	36	37	37	38	38	38	38	38		
1	10	1	50	30	31	31	32	32	33	34	34	35	35	36	36	37	37	37	38	38	39	39	40	40	41	41	41		
1	20	1	40	31	32	33	33	34	34	35	35	36	36	37	38	38	39	39	40	40	41	41	42	42	43	43	43		
1	30	1	30	32	32	33	34	34	35	35	36	36	37	38	38	39	39	40	40	41	41	42	42	43	43	43	43		

The correction is to be added to the approximate Greenwich time when the proportional logarithms in the Ephemeris are decreasing, and subtracted when they are increasing.

TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.																		
Side- real.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.									
m	u	s	m	s	m	s	m	s	s									
0	0	0.000	0	9.830	0	19.659	0	29.489	0	39.318	0	49.148	0	58.977	1	8.807	0	0.000
1	0	0.164	0	9.993	0	19.823	0	29.653	0	39.482	0	49.312	0	59.141	1	8.971	1	0.003
2	0	0.328	0	10.157	0	19.987	0	29.816	0	39.646	0	49.475	0	59.305	1	9.135	2	0.005
3	0	0.491	0	10.321	0	20.151	0	29.980	0	39.810	0	49.639	0	59.469	1	9.298	3	0.008
4	0	0.655	0	10.485	0	20.314	0	30.144	0	39.974	0	49.803	0	59.633	1	9.462	4	0.011
5	0	0.819	0	10.649	0	20.478	0	30.308	0	40.137	0	49.967	0	59.796	1	9.626	5	0.014
6	0	0.983	0	10.813	0	20.642	0	30.472	0	40.301	0	50.131	0	59.960	1	9.790	6	0.016
7	0	1.147	0	10.976	0	20.806	0	30.635	0	40.465	0	50.295	1	0.124	1	9.954	7	0.019
8	0	1.311	0	11.140	0	20.970	0	30.799	0	40.629	0	50.458	1	0.288	1	10.118	8	0.022
9	0	1.474	0	11.304	0	21.134	0	30.963	0	40.793	0	50.622	1	0.452	1	10.281	9	0.025
10	0	1.638	0	11.468	0	21.297	0	31.127	0	40.956	0	50.786	1	0.616	1	10.445	10	0.027
11	0	1.802	0	11.632	0	21.461	0	31.291	0	41.120	0	50.950	1	0.779	1	10.609	11	0.030
12	0	1.966	0	11.795	0	21.625	0	31.455	c	41.284	0	51.114	1	0.943	1	10.773	12	0.033
13	0	2.130	0	11.959	0	21.789	0	31.618	0	41.448	0	51.278	1	1.107	1	10.937	13	0.035
14	0	2.294	0	12.123	0	21.953	0	31.782	0	41.612	0	51.441	1	1.271	1	11.100	14	0.038
15	0	2.457	0	12.287	0	22.117	0	31.946	0	41.776	0	51.605	1	1.435	1	11.264	15	0.041
16	0	2.621	0	12.451	0	22.280	0	32.110	0	41.939	0	51.769	1	1.599	1	11.428	16	0.044
17	0	2.785	0	12.615	0	22.444	0	32.274	0	42.103	0	51.933	1	1.762	1	11.592	17	0.046
18	0	2.949	0	12.778	0	22.608	0	32.438	0	42.267	0	52.097	1	1.926	1	11.756	18	0.049
19	0	3.113	0	12.942	0	22.772	0	32.601	0	42.431	0	52.260	1	2.090	1	11.920	19	0.052
20	0	3.277	0	13.106	0	22.936	0	32.765	0	42.595	0	52.424	1	2.254	1	12.083	20	0.055
21	0	3.440	0	13.270	0	23.099	0	32.929	0	42.759	0	52.588	1	2.418	1	12.247	21	0.057
22	0	3.604	0	13.434	0	23.263	0	33.093	0	42.922	0	52.752	1	2.582	1	12.411	22	0.060
23	0	3.768	0	13.598	0	23.427	0	33.257	0	43.086	0	52.916	1	2.745	1	12.575	23	0.063
24	0	3.932	0	13.761	0	23.591	0	33.420	0	43.250	0	53.080	1	2.909	1	12.739	24	0.066
25	0	4.096	0	13.925	0	23.755	0	33.584	0	43.414	0	53.243	1	3.073	1	12.903	25	0.068
26	0	4.259	0	14.089	0	23.919	0	33.748	0	43.578	0	53.407	1	3.237	1	13.066	26	0.071
27	0	4.423	0	14.253	0	24.082	0	33.912	0	43.742	0	53.571	1	3.401	1	13.230	27	0.074
28	0	4.587	0	14.417	0	24.246	0	34.076	0	43.905	0	53.735	1	3.564	1	13.394	28	0.076
29	0	4.751	0	14.581	0	24.410	0	34.240	0	44.069	0	53.899	1	3.728	1	13.558	29	0.079
30	0	4.915	0	14.744	0	24.574	0	34.403	0	44.233	0	54.063	1	3.892	1	13.722	30	0.082
31	0	5.079	0	14.908	0	24.738	0	34.567	0	44.397	0	54.226	1	4.056	1	13.886	31	0.085
32	0	5.242	0	15.072	0	24.902	0	34.731	0	44.561	0	54.390	1	4.220	1	14.049	32	0.087
33	0	5.406	0	15.236	0	25.065	0	34.895	0	44.724	0	54.554	1	4.384	1	14.213	33	0.090
34	0	5.570	0	15.400	0	25.229	0	35.059	0	44.888	0	54.718	1	4.547	1	14.377	34	0.093
35	0	5.734	0	15.563	0	25.393	0	35.223	0	45.052	0	54.882	1	4.711	1	14.541	35	0.096
36	0	5.898	0	15.727	0	25.557	0	35.386	0	45.216	0	55.046	1	4.875	1	14.705	36	0.098
37	0	6.062	0	15.891	0	25.721	0	35.550	0	45.380	0	55.209	1	5.039	1	14.868	37	0.101
38	0	6.225	0	16.055	0	25.885	0	35.714	0	45.544	0	55.373	1	5.203	1	15.032	38	0.104
39	0	6.389	0	16.219	0	26.048	0	35.878	0	45.707	0	55.537	1	5.367	1	15.196	39	0.106
40	0	6.553	0	16.383	0	26.212	0	36.042	0	45.871	0	55.701	1	5.530	1	15.360	40	0.109
41	0	6.717	0	16.546	0	26.376	0	36.206	0	46.035	0	55.865	1	5.694	1	15.524	41	0.112
42	0	6.881	0	16.710	0	26.540	0	36.369	0	46.199	0	56.028	1	5.858	1	15.688	42	0.115
43	0	7.045	0	16.874	0	26.704	0	36.533	0	46.363	0	56.192	1	6.022	1	15.851	43	0.117
44	0	7.208	0	17.038	0	26.867	0	36.697	0	46.527	0	56.356	1	6.186	1	16.015	44	0.120
45	0	7.372	0	17.202	0	27.031	0	36.861	0	46.690	0	56.520	1	6.350	1	16.179	45	0.123
46	0	7.536	0	17.366	0	27.195	0	37.025	0	46.854	0	56.684	1	6.513	1	16.343	46	0.126
47	0	7.700	0	17.529	0	27.359	0	37.188	0	47.018	0	56.848	1	6.677	1	16.507	47	0.128
48	0	7.864	0	17.693	0	27.523	0	37.352	0	47.182	0	57.011	1	6.841	1	16.671	48	0.131
49	0	8.027	0	17.857	0	27.687	0	37.516	0	47.346	0	57.175	1	7.005	1	16.834	49	0.134
50	0	8.191	0	18.021	0	27.850	0	37.680	0	47.510	0	57.339	1	7.169	1	16.998	50	0.137
51	0	8.355	0	18.185	0	28.014	0	37.844	0	47.672	0	57.503	1	7.332	1	17.162	51	0.139
52	0	8.519	0	18.349	0	28.178	0	38.008	0	47.837	0	57.667	1	7.496	1	17.326	52	0.142
53	0	8.683	0	18.512	0	28.342	0	38.171	0	48.001	0	57.831	1	7.660	1	17.490	53	0.145
54	0	8.847	0	18.676	0	28.506	0	38.335	0	48.165	0	57.994	1	7.824	1	17.654	54	0.147
55	0	9.010	0	18.840	0	28.670	0	38.499	0	48.329	0	58.158	1	7.988	1	17.817	55	0.150
56	0	9.174	0	19.004	0	28.833	0	38.663	0	48.492	0	58.322	1	8.152	1	17.981	56	0.153
57	0	9.338	0	19.168	0	28.997	0	38.827	0	48.656	0	58.486	1	8.315	1	18.145	57	0.156
58	0	9.502	0	19.331	0	29.161	0	38.991	0	48.820	0	58.650	1	8.479	1	18.309	58	0.158
59	0	9.666	0	19.495	0	29.325	0	39.154	0	48.984	0	58.814	1	8.643	1	18.473	59	0.161
Side- real.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.									

TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side- real.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	1 18.636	1 28.406	1 38.296	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443	0 0.000
1	1 18.800	1 28.630	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1 0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2 0.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3 0.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4 0.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5 0.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6 0.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7 0.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8 0.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9 0.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.593	2 9.423	2 19.252	2 29.082	10 0.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11 0.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12 0.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13 0.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14 0.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15 0.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16 0.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17 0.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18 0.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19 0.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20 0.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21 0.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22 0.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.211	23 0.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24 0.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25 0.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26 0.071
27	1 23.060	1 32.889	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27 0.074
28	1 23.224	1 33.053	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28 0.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29 0.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30 0.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31 0.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32 0.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33 0.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34 0.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35 0.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36 0.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37 0.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38 0.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39 0.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40 0.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41 0.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42 0.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43 0.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44 0.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45 0.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46 0.126
47	1 26.336	1 36.166	1 45.995	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47 0.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48 0.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49 0.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50 0.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51 0.139
52	1 27.155	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52 0.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53 0.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54 0.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55 0.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56 0.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.122	2 26.952	2 36.781	57 0.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58 0.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59 0.161
Side- real.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.



TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.									
Side- real.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	2 37.273	2 47.102	2 56.932	3 6.762	3 16.591	3 26.421	3 36.250	3 46.080	0 0.000
1	2 37.437	2 47.266	2 57.096	3 6.925	3 16.755	3 26.585	3 36.414	3 46.244	1 0.003
2	2 37.601	2 47.430	2 57.260	3 7.089	3 16.919	3 26.748	3 36.578	3 46.407	2 0.005
3	2 37.764	2 47.594	2 57.424	3 7.253	3 17.083	3 26.912	3 36.742	3 46.571	3 0.008
4	2 37.928	2 47.758	2 57.587	3 7.417	3 17.246	3 27.076	3 36.906	3 46.735	4 0.011
5	2 38.092	2 47.922	2 57.751	3 7.581	3 17.410	3 27.240	3 37.069	3 46.899	5 0.014
6	2 38.256	2 48.085	2 57.915	3 7.745	3 17.574	3 27.404	3 37.233	3 47.063	6 0.016
7	2 38.420	2 48.249	2 58.079	3 7.908	3 17.738	3 27.568	3 37.397	3 47.227	7 0.019
8	2 38.584	2 48.413	2 58.243	3 8.072	3 17.902	3 27.731	3 37.561	3 47.390	8 0.022
9	2 38.747	2 48.577	2 58.406	3 8.236	3 18.066	3 27.895	3 37.725	3 47.554	9 0.025
10	2 38.911	2 48.741	2 58.570	3 8.400	3 18.229	3 28.059	3 37.889	3 47.718	10 0.027
11	2 39.075	2 48.905	2 58.734	3 8.564	3 18.393	3 28.223	3 38.052	3 47.882	11 0.030
12	2 39.239	2 49.068	2 58.898	3 8.728	3 18.557	3 28.387	3 38.216	3 48.046	12 0.033
13	2 39.403	2 49.232	2 59.062	3 8.891	3 18.721	3 28.550	3 38.380	3 48.210	13 0.035
14	2 39.566	2 49.396	2 59.226	3 9.055	3 18.885	3 28.714	3 38.544	3 48.373	14 0.038
15	2 39.730	2 49.560	2 59.389	3 9.219	3 19.049	3 28.878	3 38.708	3 48.537	15 0.041
16	2 39.894	2 49.724	2 59.553	3 9.383	3 19.212	3 29.042	3 38.871	3 48.701	16 0.044
17	2 40.058	2 49.888	2 59.717	3 9.547	3 19.376	3 29.206	3 39.035	3 48.865	17 0.046
18	2 40.222	2 50.051	2 59.881	3 9.710	3 19.540	3 29.370	3 39.199	3 49.029	18 0.049
19	2 40.386	2 50.215	3 0.045	3 9.874	3 19.704	3 29.533	3 39.363	3 49.193	19 0.052
20	2 40.549	2 50.379	3 0.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	20 0.055
21	2 40.713	2 50.543	3 0.372	3 10.202	3 20.032	3 29.861	3 39.691	3 49.520	21 0.057
22	2 40.877	2 50.707	3 0.536	3 10.366	3 20.195	3 30.025	3 39.854	3 49.684	22 0.060
23	2 41.041	2 50.870	3 0.700	3 10.530	3 20.359	3 30.189	3 40.018	3 49.848	23 0.063
24	2 41.205	2 51.034	3 0.864	3 10.693	3 20.523	3 30.353	3 40.182	3 50.012	24 0.066
25	2 41.369	2 51.198	3 1.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.175	25 0.068
26	2 41.532	2 51.362	3 1.192	3 11.021	3 20.851	3 30.680	3 40.510	3 50.339	26 0.071
27	2 41.696	2 51.526	3 1.355	3 11.185	3 21.014	3 30.844	3 40.674	3 50.503	27 0.074
28	2 41.860	2 51.690	3 1.519	3 11.349	3 21.178	3 31.008	3 40.837	3 50.667	28 0.076
29	2 42.024	2 51.853	3 1.683	3 11.513	3 21.342	3 31.172	3 41.001	3 50.831	29 0.079
30	2 42.188	2 52.017	3 1.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	30 0.082
31	2 42.352	2 52.181	3 2.011	3 11.840	3 21.670	3 31.499	3 41.329	3 51.158	31 0.085
32	2 42.515	2 52.345	3 2.174	3 12.004	3 21.834	3 31.663	3 41.493	3 51.322	32 0.087
33	2 42.679	2 52.509	3 2.338	3 12.168	3 21.997	3 31.827	3 41.657	3 51.486	33 0.090
34	2 42.843	2 52.673	3 2.502	3 12.332	3 22.161	3 31.991	3 41.820	3 51.650	34 0.093
35	2 43.007	2 52.836	3 2.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	35 0.096
36	2 43.171	2 53.000	3 2.830	3 12.660	3 22.489	3 32.318	3 42.148	3 51.978	36 0.098
37	2 43.334	2 53.164	3 2.994	3 12.823	3 22.653	3 32.482	3 42.312	3 52.141	37 0.101
38	2 43.498	2 53.328	3 3.157	3 12.987	3 22.817	3 32.646	3 42.476	3 52.305	38 0.104
39	2 43.662	2 53.492	3 3.321	3 13.151	3 22.980	3 32.810	3 42.639	3 52.469	39 0.106
40	2 43.826	2 53.656	3 3.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	40 0.109
41	2 43.990	2 53.819	3 3.649	3 13.478	3 23.308	3 33.138	3 42.967	3 52.797	41 0.112
42	2 44.154	2 53.983	3 3.813	3 13.642	3 23.472	3 33.301	3 43.131	3 52.961	42 0.115
43	2 44.317	2 54.147	3 3.977	3 13.806	3 23.636	3 33.465	3 43.295	3 53.124	43 0.117
44	2 44.481	2 54.311	3 4.140	3 13.970	3 23.800	3 33.629	3 43.459	3 53.288	44 0.120
45	2 44.645	2 54.475	3 4.304	3 14.134	3 23.963	3 33.793	3 43.622	3 53.452	45 0.123
46	2 44.809	2 54.638	3 4.468	3 14.298	3 24.127	3 33.957	3 43.786	3 53.616	46 0.126
47	2 44.973	2 54.802	3 4.632	3 14.461	3 24.291	3 34.121	3 43.950	3 53.780	47 0.128
48	2 45.137	2 54.966	3 4.796	3 14.625	3 24.455	3 34.284	3 44.114	3 53.943	48 0.131
49	2 45.300	2 55.130	3 4.960	3 14.789	3 24.619	3 34.448	3 44.278	3 54.107	49 0.134
50	2 45.464	2 55.294	3 5.123	3 14.953	3 24.782	3 34.612	3 44.442	3 54.271	50 0.137
51	2 45.628	2 55.458	3 5.287	3 15.117	3 24.946	3 34.776	3 44.605	3 54.435	51 0.139
52	2 45.792	2 55.621	3 5.451	3 15.281	3 25.110	3 34.940	3 44.769	3 54.599	52 0.142
53	2 45.956	2 55.785	3 5.615	3 15.444	3 25.274	3 35.104	3 44.933	3 54.763	53 0.145
54	2 46.120	2 55.949	3 5.779	3 15.608	3 25.438	3 35.267	3 45.097	3 54.926	54 0.147
55	2 46.283	2 56.113	3 5.942	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	55 0.150
56	2 46.447	2 56.277	3 6.106	3 15.936	3 25.765	3 35.595	3 45.425	3 55.254	56 0.153
57	2 46.611	2 56.441	3 6.270	3 16.100	3 25.929	3 35.759	3 45.588	3 55.418	57 0.156
58	2 46.775	2 56.604	3 6.434	3 16.264	3 26.093	3 35.923	3 45.752	3 55.582	58 0.158
59	2 46.939	2 56.768	3 6.598	3 16.427	3 26.257	3 36.086	3 45.916	3 55.746	59 0.161
Side- real.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.

# TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.									
Mean Solar.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	0 0.000	0 9.856	0 19.713	0 29.569	0 39.426	0 49.282	0 59.139	1 8.995	0 0.000
1	0 0.164	0 10.021	0 19.877	0 29.734	0 39.590	0 49.447	0 59.303	1 9.160	1 0.003
2	0 0.329	0 10.185	0 20.041	0 29.898	0 39.754	0 49.611	0 59.467	1 9.324	2 0.005
3	0 0.493	0 10.349	0 20.206	0 30.062	0 39.919	0 49.775	0 59.632	1 9.488	3 0.008
4	0 0.657	0 10.514	0 20.370	0 30.227	0 40.083	0 49.939	0 59.796	1 9.652	4 0.011
5	0 0.821	0 10.678	0 20.534	0 30.391	0 40.247	0 50.104	0 59.960	1 9.817	5 0.014
6	0 0.986	0 10.842	0 20.699	0 30.555	0 40.412	0 50.268	1 0.124	1 9.981	6 0.016
7	0 1.150	0 11.006	0 20.863	0 30.719	0 40.576	0 50.432	1 0.289	1 10.145	7 0.019
8	0 1.314	0 11.171	0 21.027	0 30.884	0 40.740	0 50.597	1 0.453	1 10.310	8 0.022
9	0 1.478	0 11.335	0 21.191	0 31.048	0 40.904	0 50.761	1 0.617	1 10.474	9 0.025
10	0 1.643	0 11.499	0 21.356	0 31.212	0 41.069	0 50.925	1 0.782	1 10.638	10 0.027
11	0 1.807	0 11.663	0 21.520	0 31.376	0 41.233	0 51.089	1 0.946	1 10.802	11 0.030
12	0 1.971	0 11.828	0 21.684	0 31.541	0 41.397	0 51.254	1 1.110	1 10.967	12 0.033
13	0 2.136	0 11.992	0 21.849	0 31.705	0 41.561	0 51.418	1 1.274	1 11.131	13 0.036
14	0 2.300	0 12.156	0 22.013	0 31.869	0 41.726	0 51.582	1 1.439	1 11.295	14 0.038
15	0 2.464	0 12.321	0 22.177	0 32.034	0 41.890	0 51.746	1 1.603	1 11.459	15 0.041
16	0 2.628	0 12.485	0 22.341	0 32.198	0 42.054	0 51.911	1 1.767	1 11.624	16 0.044
17	0 2.793	0 12.649	0 22.506	0 32.362	0 42.219	0 52.075	1 1.932	1 11.788	17 0.047
18	0 2.957	0 12.813	0 22.670	0 32.526	0 42.383	0 52.239	1 2.096	1 11.952	18 0.049
19	0 3.121	0 12.978	0 22.834	0 32.691	0 42.547	0 52.404	1 2.260	1 12.117	19 0.052
20	0 3.285	0 13.142	0 22.998	0 32.855	0 42.711	0 52.568	1 2.424	1 12.281	20 0.055
21	0 3.450	0 13.306	0 23.163	0 33.019	0 42.876	0 52.732	1 2.589	1 12.445	21 0.057
22	0 3.614	0 13.471	0 23.327	0 33.183	0 43.040	0 52.896	1 2.753	1 12.609	22 0.060
23	0 3.778	0 13.635	0 23.491	0 33.348	0 43.204	0 53.061	1 2.917	1 12.774	23 0.063
24	0 3.943	0 13.799	0 23.656	0 33.512	0 43.368	0 53.225	1 3.081	1 12.938	24 0.066
25	0 4.107	0 13.963	0 23.820	0 33.676	0 43.533	0 53.389	1 3.246	1 13.102	25 0.068
26	0 4.271	0 14.128	0 23.984	0 33.841	0 43.697	0 53.554	1 3.410	1 13.266	26 0.071
27	0 4.435	0 14.292	0 24.148	0 34.005	0 43.861	0 53.718	1 3.574	1 13.431	27 0.074
28	0 4.600	0 14.456	0 24.313	0 34.169	0 44.026	0 53.882	1 3.739	1 13.595	28 0.077
29	0 4.764	0 14.620	0 24.477	0 34.333	0 44.190	0 54.046	1 3.903	1 13.759	29 0.079
30	0 4.928	0 14.785	0 24.641	0 34.498	0 44.354	0 54.211	1 4.067	1 13.924	30 0.082
31	0 5.093	0 14.949	0 24.805	0 34.662	0 44.518	0 54.375	1 4.231	1 14.088	31 0.085
32	0 5.257	0 15.113	0 24.970	0 34.826	0 44.683	0 54.539	1 4.396	1 14.252	32 0.088
33	0 5.421	0 15.278	0 25.134	0 34.990	0 44.847	0 54.703	1 4.560	1 14.416	33 0.090
34	0 5.585	0 15.442	0 25.298	0 35.155	0 45.011	0 54.868	1 4.724	1 14.581	34 0.093
35	0 5.750	0 15.606	0 25.463	0 35.319	0 45.176	0 55.032	1 4.888	1 14.745	35 0.096
36	0 5.914	0 15.770	0 25.627	0 35.483	0 45.340	0 55.196	1 5.053	1 14.909	36 0.099
37	0 6.078	0 15.935	0 25.791	0 35.648	0 45.504	0 55.361	1 5.217	1 15.073	37 0.101
38	0 6.242	0 16.099	0 25.955	0 35.812	0 45.668	0 55.525	1 5.381	1 15.238	38 0.104
39	0 6.407	0 16.263	0 26.120	0 35.976	0 45.833	0 55.689	1 5.546	1 15.402	39 0.107
40	0 6.571	0 16.427	0 26.284	0 36.140	0 45.997	0 55.853	1 5.710	1 15.566	40 0.110
41	0 6.735	0 16.592	0 26.448	0 36.305	0 46.161	0 56.018	1 5.874	1 15.731	41 0.112
42	0 6.900	0 16.756	0 26.612	0 36.469	0 46.325	0 56.182	1 6.038	1 15.895	42 0.115
43	0 7.064	0 16.920	0 26.777	0 36.633	0 46.490	0 56.346	1 6.203	1 16.059	43 0.118
44	0 7.228	0 17.085	0 26.941	0 36.798	0 46.654	0 56.510	1 6.367	1 16.223	44 0.120
45	0 7.392	0 17.249	0 27.105	0 36.962	0 46.818	0 56.675	1 6.531	1 16.388	45 0.123
46	0 7.557	0 17.413	0 27.270	0 37.126	0 46.983	0 56.839	1 6.695	1 16.552	46 0.126
47	0 7.721	0 17.577	0 27.434	0 37.290	0 47.147	0 57.003	1 6.860	1 16.716	47 0.129
48	0 7.885	0 17.742	0 27.598	0 37.455	0 47.311	0 57.168	1 7.024	1 16.881	48 0.131
49	0 8.049	0 17.906	0 27.762	0 37.619	0 47.475	0 57.332	1 7.188	1 17.045	49 0.134
50	0 8.214	0 18.070	0 27.927	0 37.783	0 47.640	0 57.496	1 7.353	1 17.209	50 0.137
51	0 8.378	0 18.234	0 28.091	0 37.947	0 47.804	0 57.660	1 7.517	1 17.373	51 0.140
52	0 8.542	0 18.399	0 28.255	0 38.112	0 47.968	0 57.825	1 7.681	1 17.538	52 0.142
53	0 8.707	0 18.563	0 28.420	0 38.276	0 48.132	0 57.989	1 7.845	1 17.702	53 0.145
54	0 8.871	0 18.727	0 28.584	0 38.440	0 48.297	0 58.153	1 8.010	1 17.866	54 0.148
55	0 9.035	0 18.892	0 28.748	0 38.605	0 48.461	0 58.317	1 8.174	1 18.030	55 0.151
56	0 9.199	0 19.056	0 28.912	0 38.769	0 48.625	0 58.482	1 8.338	1 18.195	56 0.153
57	0 9.364	0 19.220	0 29.077	0 38.933	0 48.790	0 58.646	1 8.502	1 18.359	57 0.156
58	0 9.528	0 19.384	0 29.241	0 39.097	0 48.954	0 58.810	1 8.667	1 18.523	58 0.159
59	0 9.692	0 19.549	0 29.405	0 39.262	0 49.118	0 58.975	1 8.831	1 18.688	59 0.162
Mean Solar.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.

TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.									
Mean Solar.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	1 18.552	1 24.08	1 38.565	1 44.421	1 58.278	2 8.134	2 17.991	2 27.847	0 0.000
1	1 19.016	1 28.573	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	1 0.003
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	2 0.005
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	3 0.008
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	4 0.011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	5 0.014
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	6 0.016
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	7 0.019
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	8 0.022
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	9 0.025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	10 0.027
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	11 0.030
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	12 0.033
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	13 0.036
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	14 0.038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	15 0.041
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	16 0.044
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	17 0.047
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	18 0.049
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	19 0.052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	20 0.055
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	21 0.057
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	22 0.060
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	23 0.063
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	24 0.066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	25 0.068
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	26 0.071
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	27 0.074
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	28 0.077
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	29 0.079
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	30 0.082
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	31 0.085
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	32 0.088
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	33 0.090
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	34 0.093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	35 0.096
36	1 24.766	1 34.622	1 44.479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	36 0.099
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	37 0.101
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	38 0.104
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	39 0.107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	40 0.110
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	41 0.112
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	42 0.115
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	43 0.118
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	44 0.120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	45 0.123
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	46 0.126
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	47 0.129
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	48 0.131
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	49 0.134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	50 0.137
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	51 0.140
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	52 0.142
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	53 0.145
54	1 27.723	1 37.579	1 47.435	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	54 0.148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	55 0.151
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	56 0.153
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	57 0.156
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	58 0.159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.539	59 0.162
Mean Solar.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.

TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.									
Mean Solar.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	2 37.704	2 47.560	2 57.417	3 7.273	3 17.129	3 26.985	3 36.842	3 46.699	0 0.000
1	2 37.868	2 47.724	2 57.581	3 7.437	3 17.294	3 27.150	3 37.007	3 46.863	1 0.003
2	2 38.032	2 47.889	2 57.745	3 7.602	3 17.458	3 27.315	3 37.171	3 47.027	2 0.005
3	2 38.196	2 48.053	2 57.909	3 7.766	3 17.622	3 27.479	3 37.335	3 47.192	3 0.008
4	2 38.361	2 48.217	2 58.074	3 7.930	3 17.787	3 27.643	3 37.500	3 47.356	4 0.011
5	2 38.525	2 48.381	2 58.238	3 8.094	3 17.951	3 27.807	3 37.664	3 47.520	5 0.014
6	2 38.689	2 48.546	2 58.402	3 8.259	3 18.115	3 27.972	3 37.828	3 47.685	6 0.016
7	2 38.854	2 48.710	2 58.566	3 8.423	3 18.279	3 28.136	3 37.992	3 47.849	7 0.019
8	2 39.018	2 48.874	2 58.731	3 8.587	3 18.444	3 28.300	3 38.157	3 48.013	8 0.022
9	2 39.182	2 49.039	2 58.895	3 8.751	3 18.608	3 28.464	3 38.321	3 48.177	9 0.025
10	2 39.346	2 49.203	2 59.059	3 8.916	3 18.772	3 28.629	3 38.485	3 48.342	10 0.027
11	2 39.511	2 49.367	2 59.224	3 9.080	3 18.937	3 28.793	3 38.649	3 48.506	11 0.030
12	2 39.675	2 49.531	2 59.388	3 9.244	3 19.101	3 28.957	3 38.814	3 48.670	12 0.033
13	2 39.839	2 49.696	2 59.552	3 9.409	3 19.265	3 29.122	3 38.978	3 48.834	13 0.036
14	2 40.003	2 49.860	2 59.716	3 9.573	3 19.429	3 29.286	3 39.142	3 48.999	14 0.038
15	2 40.168	2 50.024	2 59.881	3 9.737	3 19.594	3 29.450	3 39.307	3 49.163	15 0.041
16	2 40.332	2 50.188	3 0.045	3 9.901	3 19.758	3 29.614	3 39.471	3 49.327	16 0.044
17	2 40.496	2 50.353	3 0.209	3 10.066	3 19.922	3 29.779	3 39.635	3 49.492	17 0.047
18	2 40.661	2 50.517	3 0.373	3 10.230	3 20.086	3 29.943	3 39.799	3 49.656	18 0.049
19	2 40.825	2 50.681	3 0.538	3 10.394	3 20.251	3 30.107	3 39.964	3 49.820	19 0.052
20	2 40.989	2 50.846	3 0.702	3 10.559	3 20.415	3 30.271	3 40.128	3 49.984	20 0.055
21	2 41.153	2 51.010	3 0.866	3 10.723	3 20.579	3 30.436	3 40.292	3 50.149	21 0.057
22	2 41.318	2 51.174	3 1.031	3 10.887	3 20.744	3 30.600	3 40.456	3 50.313	22 0.060
23	2 41.482	2 51.338	3 1.195	3 11.051	3 20.908	3 30.764	3 40.621	3 50.477	23 0.063
24	2 41.646	2 51.503	3 1.359	3 11.216	3 21.072	3 30.929	3 40.785	3 50.642	24 0.066
25	2 41.810	2 51.667	3 1.523	3 11.380	3 21.236	3 31.093	3 40.949	3 50.806	25 0.068
26	2 41.975	2 51.831	3 1.688	3 11.544	3 21.401	3 31.257	3 41.114	3 50.970	26 0.071
27	2 42.139	2 51.995	3 1.852	3 11.708	3 21.565	3 31.421	3 41.278	3 51.134	27 0.074
28	2 42.303	2 52.160	3 2.016	3 11.873	3 21.729	3 31.586	3 41.442	3 51.299	28 0.077
29	2 42.468	2 52.324	3 2.181	3 12.037	3 21.893	3 31.750	3 41.606	3 51.463	29 0.079
30	2 42.632	2 52.488	3 2.345	3 12.201	3 22.058	3 31.914	3 41.771	3 51.627	30 0.082
31	2 42.796	2 52.653	3 2.509	3 12.366	3 22.222	3 32.078	3 41.935	3 51.791	31 0.085
32	2 42.960	2 52.817	3 2.673	3 12.530	3 22.386	3 32.243	3 42.099	3 51.956	32 0.088
33	2 43.125	2 52.981	3 2.838	3 12.694	3 22.551	3 32.407	3 42.264	3 52.120	33 0.090
34	2 43.289	2 53.145	3 3.002	3 12.858	3 22.715	3 32.571	3 42.428	3 52.284	34 0.093
35	2 43.453	2 53.310	3 3.166	3 13.023	3 22.879	3 32.736	3 42.592	3 52.449	35 0.096
36	2 43.617	2 53.474	3 3.330	3 13.187	3 23.043	3 32.900	3 42.756	3 52.613	36 0.099
37	2 43.782	2 53.638	3 3.495	3 13.351	3 23.208	3 33.064	3 42.921	3 52.777	37 0.101
38	2 43.946	2 53.803	3 3.659	3 13.515	3 23.372	3 33.228	3 43.085	3 52.941	38 0.104
39	2 44.110	2 53.967	3 3.823	3 13.680	3 23.536	3 33.393	3 43.249	3 53.105	39 0.107
40	2 44.275	2 54.131	3 3.988	3 13.844	3 23.700	3 33.557	3 43.413	3 53.270	40 0.110
41	2 44.439	2 54.295	3 4.152	3 14.008	3 23.865	3 33.721	3 43.578	3 53.434	41 0.112
42	2 44.603	2 54.460	3 4.316	3 14.173	3 24.029	3 33.886	3 43.742	3 53.598	42 0.115
43	2 44.767	2 54.624	3 4.480	3 14.337	3 24.193	3 34.050	3 43.906	3 53.763	43 0.118
44	2 44.932	2 54.788	3 4.645	3 14.501	3 24.358	3 34.214	3 44.071	3 53.927	44 0.120
45	2 45.096	2 54.952	3 4.809	3 14.665	3 24.522	3 34.378	3 44.235	3 54.091	45 0.123
46	2 45.260	2 55.117	3 4.973	3 14.830	3 24.686	3 34.543	3 44.399	3 54.256	46 0.126
47	2 45.425	2 55.281	3 5.137	3 14.994	3 24.850	3 34.707	3 44.563	3 54.420	47 0.129
48	2 45.589	2 55.445	3 5.302	3 15.158	3 25.015	3 34.871	3 44.728	3 54.584	48 0.131
49	2 45.753	2 55.610	3 5.466	3 15.322	3 25.179	3 35.035	3 44.892	3 54.748	49 0.134
50	2 45.917	2 55.774	3 5.630	3 15.487	3 25.343	3 35.200	3 45.056	3 54.913	50 0.137
51	2 46.082	2 55.938	3 5.795	3 15.651	3 25.508	3 35.364	3 45.220	3 55.077	51 0.140
52	2 46.246	2 56.102	3 5.959	3 15.815	3 25.672	3 35.528	3 45.385	3 55.241	52 0.142
53	2 46.410	2 56.267	3 6.123	3 15.980	3 25.836	3 35.693	3 45.549	3 55.405	53 0.145
54	2 46.574	2 56.431	3 6.287	3 16.144	3 26.000	3 35.857	3 45.713	3 55.570	54 0.148
55	2 46.739	2 56.595	3 6.452	3 16.308	3 26.165	3 36.021	3 45.878	3 55.734	55 0.151
56	2 46.903	2 56.759	3 6.616	3 16.472	3 26.329	3 36.185	3 46.042	3 55.898	56 0.153
57	2 47.067	2 56.924	3 6.780	3 16.637	3 26.493	3 36.350	3 46.206	3 56.063	57 0.156
58	2 47.232	2 57.088	3 6.944	3 16.801	3 26.657	3 36.514	3 46.370	3 56.227	58 0.159
59	2 47.396	2 57.252	3 7.109	3 16.965	3 26.822	3 36.678	3 46.535	3 56.391	59 0.162
Mean Solar.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.

# TABLE IV.—LATITUDE BY POLARIS.

## TABLE FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS.

Reduce the observed altitude of Polaris to the true altitude.

Reduce the recorded time of observation to local sidereal time.

If the sidereal time is  $\begin{cases} \text{less than } 1^h 17^m.6, \text{ subtract it from } 1^h 17^m.6; \\ \text{between } 1^h 17^m.6 \text{ and } 13^h 17^m.6, \text{ subtract } 1^h 17^m.6 \text{ from it;} \\ \text{greater than } 13^h 17^m.6, \text{ subtract it from } 25^h 17^m.6; \end{cases}$

and the remainder is the hour-angle of Polaris.

With this hour-angle take out the correction from Table IV, and add it to or subtract it from the true altitude, according to its sign. The result is the latitude of the place.

*Example.*—1888, November 10, at  $9^h 29^m 29^s$ , P. M., mean solar time, in longitude  $29^\circ$  east of Greenwich, suppose the true altitude of Polaris to be  $29^\circ 29'$ : required the latitude of the place.

Local astronomical mean time	$9^h 29^m 29^s$
Reduction from Table III, for $9^h 29^m 29^s$	$+ 1^m 34^s$
Greenwich sidereal time of mean noon, November 10, page 183	$15^h 20^m 17.5^s$
Reduction from Table III, for longitude ( $= 1^h 56^m$ east, or minus)	$- 0^m 19^s$
Sum (having regard to signs) is equal to local sidereal time	$0^h 51^m 1.5^s$
Subtract sidereal time	$0^h 51^m 1.5^s$
Remainder is equal to hour-angle of Polaris	$0^h 26^m 34.5^s$
True altitude	$+ 29^\circ 29.0'$
Correction from Table IV.	$- 1^m 16.7^s$
Latitude	$+ 28^\circ 12.3'$



TABLE IV.—1888.

Hour-Angle.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .
m						
0	- 1 17.3 0.0	- 1 14.7 0.5	- 1 6.9 0.9	- 0 54.7 1.3	- 0 38.6 1.4	- 0 20.0 1.6
5	1 17.3 +0.1	1 14.2 0.5	1 6.0 0.9	0 53.5 1.2	0 37.2 1.5	0 18.4 1.6
10	1 17.2 0.1	1 13.7 0.5	1 5.1 0.9	0 52.3 1.3	0 35.7 1.5	0 16.8 1.6
15	1 17.1 0.1	1 13.2 0.6	1 4.2 0.9	0 51.0 1.3	0 34.2 1.5	0 15.1 1.7
20	- 1 17.0 0.2	- 1 12.6 0.6	- 1 3.3 1.0	- 0 49.7 1.3	- 0 32.7 1.5	- 0 13.4 1.7
25	1 16.8 0.2	1 12.0 0.6	1 2.3 1.0	0 48.4 1.3	0 31.2 1.5	0 11.7 1.7
30	1 16.6 0.2	1 11.4 0.6	1 1.3 1.0	0 47.1 1.3	0 29.6 1.6	0 10.1 1.6
35	1 16.4 0.3	1 10.8 0.6	1 0.3 1.1	0 45.7 1.4	0 28.0 1.6	0 8.4 1.7
40	- 1 16.1 0.3	- 1 10.1 0.8	- 0 59.2 1.1	- 0 44.3 1.4	- 0 26.4 1.6	- 0 6.7 1.6
45	1 15.8 0.3	1 9.3 0.8	0 58.1 1.1	0 42.9 1.4	0 24.8 1.6	0 5.1 1.6
50	1 15.5 0.3	1 8.5 0.8	0 57.0 1.1	0 41.5 1.4	0 23.2 1.6	0 3.4 1.7
55	1 15.1 0.4	1 7.7 0.8	0 55.9 1.1	0 40.1 1.4	0 21.6 1.6	- 0 1.7 1.7
60	- 1 14.7 0.4	- 1 6.9 0.8	- 0 54.7 1.2	- 0 38.6 1.5	- 0 20.0 1.6	+ 0 0.0 1.7
Hour-Angle.	6 <sup>h</sup> .	7 <sup>h</sup> .	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .
m						
0	+ 0 0.0 1.7	+ 0 20.0 1.6	+ 0 38.6 1.5	+ 0 54.7 1.3	+ 1 6.9 0.8	+ 1 14.7 0.4
5	0 1.7 1.7	0 21.6 1.6	0 40.1 1.4	0 55.9 1.1	1 7.7 0.8	1 15.1 0.4
10	0 3.4 1.7	0 23.2 1.6	0 41.5 1.4	0 57.0 1.1	1 8.5 0.8	1 15.5 0.4
15	0 5.1 1.6	0 24.8 1.6	0 42.9 1.4	0 58.1 1.1	1 9.3 0.8	1 15.8 0.3
20	+ 0 6.7 1.7	+ 0 26.4 1.6	+ 0 44.3 1.4	+ 0 59.2 1.1	+ 1 10.1 0.7	+ 1 16.1 0.3
25	0 8.4 1.7	0 28.0 1.6	0 45.7 1.4	1 0.3 1.1	1 10.8 0.7	1 16.4 0.3
30	0 10.1 1.7	0 29.6 1.6	0 47.1 1.4	1 1.3 1.0	1 11.4 0.6	1 16.6 0.2
35	0 11.7 1.6	0 31.2 1.6	0 48.4 1.3	1 2.3 1.0	1 12.0 0.6	1 16.8 0.2
40	+ 0 13.4 1.7	+ 0 32.7 1.5	+ 0 49.7 1.3	+ 1 3.3 0.9	+ 1 12.6 0.6	+ 1 17.0 0.1
45	0 15.1 1.7	0 34.2 1.5	0 51.0 1.3	1 4.2 0.9	1 13.2 0.5	1 17.1 0.1
50	0 16.8 1.6	0 35.7 1.5	0 52.3 1.2	1 5.1 0.9	1 13.7 0.5	1 17.2 0.1
55	0 18.4 1.6	0 37.2 1.5	0 53.5 1.2	1 6.0 0.9	1 14.2 0.5	1 17.3 0.1
60	+ 0 20.0 1.6	+ 0 38.6 1.4	+ 0 54.7 1.2	+ 1 6.9 0.9	+ 1 14.7 0.5	+ 1 17.3 0.0

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